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Railway Age

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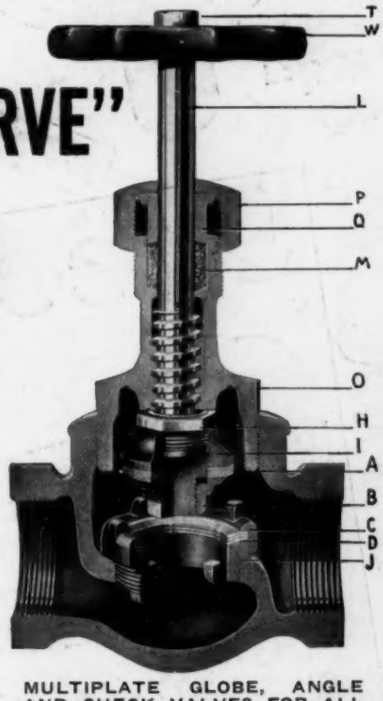

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Indexes to Volume 76

The indexes to the last volume of the *Railway Age* are now ready for distribution. Those desiring indexes to this volume should advise the New York office, 30 Church Street.

Where Remote Control Switch Machines Help

One road that is making a drive for fuel conservation is investigating the possibilities of remote control switch machines for passing tracks, as a method of eliminating train stops. At a certain station on single track a train which stops to enter either end of the passing track is forced to start again on a grade. As this division has recently been equipped with automatic signaling, the control and operation of these switch machines will become a part of the signaling system. The operator, who is located about midway between the ends of the passing track, will control the operation of the switches and signals governing movements into and out of the siding by means of a small lever stand on his table. The idea of installing these switch machines at this point was started to save fuel, but as soon as the facilities are in operation the improvement of train operation will prove to be much more important than the fuel saved, as is being demonstrated on other roads. With trains moving into or out of this passing track without the necessity of stopping to operate the switch, delays will be reduced, and the pulling of draw-bars and the damage to equipment from this cause will be eliminated. With these evident advantages it seems likely that other roads might well investigate the possibilities of reducing delays in this manner at points where conditions of grade or density of traffic require the elimination of train stops at the entrance of sidings.

The Effect of Illumination on Production

One of the outstanding developments in the last few years in the design of shops, enginehouses and other railway buildings in which men are employed, has been the greatly increased attention which has been given to illumination, both natural and artificial. This is a reflection of the fact that industry in general is learning that the provision of adequate illumination not only increases the efficiency of the workmen by inducing greater accuracy and raising production, but also reduces accidents and is proving beneficial in other ways. In railway buildings this has been evidenced by the greatly increased substitution of glass areas for solid walls. In the construction of the extensions to its shops at Pittsburg, Kan., which were described in the *Railway Age* of June 28 (page 1807), this idea was carried a step farther by the painting of the interior of the shop building with two coats of white enamel which not only increases the illumination when new, but which can be easily maintained. The importance of the latter point can well be considered by railway officers for occasions are not rare where the advantages of increased illumination have been lost quickly by failure to maintain them properly. The average railway building is constantly subjected to smoke and steam which, with the dirt normally in the atmosphere, soon coats all windows and destroys a large part of their illuminating value unless some provision is made for cleaning them at regular intervals. The folly of neglect in this respect is so obvious that it should be necessary only to call attention to it to insure its remedy. Illumination bears such a direct relation to the efficiency of workmen that no officer can afford to do other than take full advantage of every opportunity to secure the best possible results from it.

Are Mechanical Officers Aggressive Enough?

It has been said, and with some justification, that railroad mechanical officers are not aggressive enough in promoting improvements in the mechanical department, particularly in securing modern shop facilities and engine terminals equipped for the expeditious turning of power. Few, if any, roads are in a financial position to provide all the improvements in all departments as needed and consequently the department which presents its needs to the management most forcefully receives first attention. In too many cases the mechanical officers, while fully appreciating how much inadequate facilities cost the railroads, do not present their case in such a way that the management sees at a glance that their needs are of primary importance. As a result mechanical department improvements are repeatedly postponed, sometimes, it is safe to say for the sake of less important improvements in other departments. The following is a significant comment regarding this subject, quoted from an address by Commissioner Frank McManamy, of the Interstate Commerce Commission at the Mechanical Division Convention at Atlantic City: "One of the things for which I think the mechanical department can rightfully be criticised is that you are not aggressive enough in selling your good ideas to the management. Develop your plans, calculate the saving which will result, show the management that in asking for necessary funds you are working in their interests, and then work for the adoption of what you know to be right."

Manual Block System Needs Improving

The investigation of train accidents by the Interstate Commerce Commission during the past 20 years has without doubt done a good deal of good; has given to the whole railroad world numerous lessons in safety which otherwise would have been learned only in local circles or would have spread very slowly. Our correspondent, V. P. O., in expressing the belief that it is not possible to find any good results whatever, lets his radicalism run away with him. It is true, of course, that the railroads do not advertise their reformations; but the entire absence of any back talk, or criticism of any kind, in public or in private, affords pretty good evidence that the governmental preachments have usually hit the mark. The facts alone, without regard to any official comment, afford, indeed, all necessary hortatory material. It is to be admitted that an average of one collision a month, of the

class referred to by our correspondent, indicates a general condition that calls very definitely for correction. It is no exaggeration to say that these six collisions—Amboy, Ark.; Fowler, Colo.; Nahunta, Ga.; Elsiecoal, Ky.; Biloxi, Miss., and Cleveland, Tenn.—would of themselves afford all necessary lessons, if only the lessons could be learned by the right men, to correct substantially all of the faulty train-operating practices which are the cause of this ever-recurring record of collisions on roads not equipped with automatic signals. However, pending workable agreements among the railroads, or intelligent action by the government, on such a far-reaching and perplexing problem as the cure of all carelessness, every progressive railroad officer must agree that V. P. O.'s main point, the adoption and perfection of the manual block system (where the automatic is too costly), is a practical problem, demanding serious attention everywhere. And without giving the word any extreme or unreasonable meaning, it must be said that on a very large mileage the second word, "perfection," is the more important of the two. Block signaling that is not perfect, and not intended to be perfect, is much too common on American railroads.

Standardizing Welding Practices

In a recent issue of the *Railway Age*, the need was shown for co-ordinating the activities of the several societies and associations interested in the subject of fusion welding. Such co-ordination will mean rapid progress in improving and increasing the application of fusion welding. The next logical step will be to collect and distribute information on best welding methods so that practices on all roads may be uniform, or at least so that the practice on any one road will be acceptable on any other. Equipment that is interchanged must comply with rigid specifications. Some roads are better equipped for welding than others and because some are poorly equipped, welding practices as applied to interchanged cars must be limited. This limitation, while necessary, is a handicap to economy and is one example of the need for manuals on welding practices and for education and training of operators.

A Problem of Business Administration

Locomotives are one of the most directly productive features of the railway plant. It is partly for this reason that capital has been more easily secured for the purchase of new locomotives than for the equally essential fixed facilities which go to make up the completed transportation machine. During the period of intensive development of the locomotive, covering the last two decades, which has greatly increased its effectiveness and the efficiency of its operation, comparatively little thought has been given to the business aspect of its employment. The relative ease with which capital could be secured for investment in locomotives no doubt played a part in the natural development of this condition. Now, however, there is ample evidence of an awakening realization that the potential productivity of the modern locomotive has not been utilized. One of the most striking evidences of this realization is the extent to which the railroads are increasing the length of locomotive runs in both passenger and freight service. Elsewhere in this issue the present status of this practice is presented in a paper by F. E. Russell before a recent meeting of the Pacific Railway Club, in which he points out that the long locomotive run is not an end in itself, but merely a means of securing more miles per month per locomotive owned. The fact that the long run has in many cases proved an effective means of increasing the mileage service of locomotives does not justify the conclusion that there are not other means of securing the same end. Indeed, other means are much needed to meet conditions where local limitations do not permit the extension of locomotive runs beyond the present established engine districts. There are, for instance, the turn-around run and the assignment of locomotives to regular crews, both of which are being practiced with good results under certain conditions. The value of the latter practice has been a matter of controversy for many years but the success with which it is being followed on a limited number of railroads suggests that it is still worthy of attention. The joint committee of mechanical and operating officers appointed by the Board of Directors of the American Railway Association, while limited to the determination of (a) the percentage of time that locomotives should be available to perform actual transportation, and (b) the methods for obtaining maximum efficiency while so available, will undoubtedly lay the foundation for a business-like solution of the problem of locomotive utilization. It will, however, find that the answers to both questions assigned to it depend on the nature of other facilities and practices; and before a final solution is reached, the relative importance of additional investments in locomotives and in facilities for their maintenance and conditioning, must be determined. The problem is one of the broadest in the whole field of railway operation and demands sound business judgment in its solution.

The Decline of Traffic and Earnings

THE RAILWAYS are in the unpleasant situation of being fully prepared to handle a large traffic efficiently and economically and of not having the traffic to handle. Expenditures for maintenance of way this year have thus far exceeded those of last year and the tracks and other permanent structures of most railways are in unusually good condition. The drive which was begun almost two years ago to increase the amount of equipment and improve its condition has been successful. There have been, for more than a year, extraordinarily large retirements of obsolete and worn-out locomotives and cars, and thus far this year maintenance of equipment expenditures have been substantially smaller than last year. Nevertheless, there are larger numbers of locomotives and freight cars in good condition and ready for service than there were a year ago after the roads had handled in the early part of the year a freight business that broke all records. In April, the latest month for which the statistics are available, the total number of freight locomotives was 33,067, or only 104 more than a year before. The number in serviceable condition, however, was 26,726, or 1,593 more than a year before, and the number stored was 4,162, or 3,322 more than a year before. The number of freight cars on line on June 15 was about 30,000 more than a year before and the number in bad order was slightly less, the result being that the number now available in serviceable condition is approximately 40,000 more than a year ago. The result of the increase in the number of cars in good condition and of the decline in business was that on June 22 the railways had 359,644 surplus freight cars that were in good repair and immediately available for service. Of these 153,311 were box cars and 167,315 coal cars.

The statistics of revenues and expenses for May illustrate strikingly the extent of the decline in traffic that has occurred and the effect it has been producing on earnings, both gross and net. Freight business of the eastern lines was about 18 per cent less than in May, 1923, that of the southern lines

about 13 per cent less and that of the western lines about 6 per cent less. Total earnings were $477,229,000 or almost 13 per cent less than in May, 1923. Net operating income was only $60,595,197 as compared with $90,253,632 in May, 1923, a decline of 32 per cent. In the first five months of the year, net operating income was $33,263,000 less than in 1923, or at the annual rate of 4.27 per cent on the property investment, as compared with 4.98 per cent for the same period in 1923.

If business should continue to be as poor as compared with what it was in 1923 during the rest of the year as it was during the first half of the year the year as a whole would be a bad one for the railways. Fortunately this does not seem likely to be the case. First, it should not be forgotten that in the first half of 1923 the railways did exceptionally well, earning more operating income than in the first half of any previous year. Secondly, their business did not continue to be so good in the second half of last year as in the first half. There was not the usual seasonal increase in freight business in the second half of last year. It is almost inconceivable that there will not be a substantial increase in freight business in the second half of 1924. For almost four months shipments of bituminous coal have been averaging only about seven million tons a week, which is about 35 per cent less than the normal average weekly consumption. It must be that storage supplies have been largely drawn upon and that there will soon begin a large increase in coal shipments. There has been a rising stock market for some weeks. This obviously is mainly due to cheap money, which reflects the existence of a large amount of surplus capital available for investment. If the political situation, which has for a long time been such a blight upon business, should clear up, this capital would begin seeking investment, which also would indirectly cause an increase in railroad business.

The railway managements have done their duty. They have done all they could to put the properties in shape to handle an increased traffic satisfactorily. There appear to be good reasons for believing that sooner or later the traffic they have made preparations to handle will come, and when it does it should result in a large increase in railway net earnings. Just when it will come, however, nobody would have the hardihood to predict.

The Railway Labor Leaders in Politics

Senator La Follette was "nominated" for president by the "Conference for Progressive Political Action" at Cleveland on July 5. The "conference" was a gathering of radicals who vary in hue from pale pink to red. Avowed communists and bolsheviks were asked to stay away. It was feared their presence and participation would do the cause harm. Avowed socialists were welcome and numerous, and immediately afterward the national Socialist party indorsed Mr. La Follette's candidacy. The principal difference between a Bolshevik and a Socialist is that the former wants to establish socialism by force while the latter wants to establish it by votes. The ultimate purpose of both is public ownership and management of everything.

Actively participating in and dominating the "conference" were leaders of railway labor unions. The Brotherhood of Railway Trainmen was not represented. Its leaders were out of sympathy with the proceedings but other railway labor leaders were there. William H. Johnston, president of the International Machinists' Union, was chairman of the conference; T. C. Cashen, president of the United Switchmen of America, was chairman of the rules committee; H. P. Daugherty, vice-president of the Brotherhood of Locomotive Engineers, was chairman of the finance committee, and D. R. Richberg, general counsel of the railway labor organizations, was chairman of the committee on resolutions. The fact that an officer of a railway labor union is chairman of the finance committee indicates where the funds for La Follette's campaign are to come from.

The platform sent to the meeting by Senator La Follette was adopted. It declares for the repeal of the Transportation Act and also for government ownership of railroads.

For more than 25 years Senator La Follette has been the most inveterate, reckless and unfair assailant of private management of railways in the United States. He long professed to be in favor only of regulation of railways, but he promoted every kind of legislation that would restrict and burden railway managements and reduce railway net returns, and finally he recently became consistent and announced himself for government ownership. And now we witness the spectacle of Mr. La Follette being put up for president by an organization the brains and financial backbone of which are furnished by the leaders of labor unions composed of railway employees. Could any more complete proof be afforded of the charge, which has been repeatedly made by the *Railway Age*, that the true ultimate object of a majority of the railway labor leaders for years has been to wreck the railway companies and thereby make government ownership unavoidable?

Meantime, we raise a question we have raised before. By what authority do these labor leaders presume to commit their unions to the support of a particular candidate for president, and to the platform written by that candidate? The members of no labor union have voted upon the matter. Is it a fact that the leaders of these unions have such autocratic power that they can commit their unions to a particular political platform and a specific candidate for president without ever consulting their members? Can they use union funds to pay political expenses without the consent of the members who pay the dues? If so, the unions are ruled by dictators. Their leaders claim to favor democracy in government and in railway management, but apparently there is no vestige of democracy in the unions.

The *Railway Age* is not a political paper. It is, however, a railroad paper and continues to discuss the railroad question even when it gets into politics. La Follette's candidacy will be dangerous to the railways only if he succeeds in carrying some western and northwestern states. He can do that only if he gets the votes of a large part of the farmers. He and his supporters hope that he will do that. His nomination as the candidate of railway labor unions will make it necessary to point out repeatedly to the farmers some very important facts. It will be disagreeable to the railway labor leaders and even to many railway employees to have these facts pointed out. It probably in the long run will do the employees harm. If the farmers will listen and heed it will do the farmers good.

Unless we are greatly mistaken, the most outstanding features of this extraordinary expedition of the railway labor unions into politics will finally be held to be its effrontery and its folly. It is already notable above all previous political movements for its impudent effrontery. The western and northwestern farmers believe freight rates are too high and want them reduced. The railway labor unions invite the farmers to join with them in supporting Senator La Follette to bring about reductions of rates. But why are the rates high? Who is getting the money from higher rates? The average wage per hour of railway employees is now 126 per cent higher than it was in 1916 before any rates were advanced. That is the main reason why freight rates cannot be further reduced. The total earnings of the railways in 1923 were $2,666,000,000 more than in 1916. The total

wages (excluding salaries of officers) paid by them in 1923 were $1,544,224,000 more than in 1916. In other words, out of every $1 of increase in earnings that the railways derived from increased traffic and higher rates, they paid out 58 cents in increased wages to labor. The increase in the freight charges paid upon farm products between 1916 and 1923 was about $330,000,000. Of that increase in freight charges the railways immediately handed over to their employees 58 per cent, or about $191,400,000. The railway companies themselves did not get a cent of the increase in rates. Because of increased expenses and taxes the net operating income they received in 1923, and in every other year since 1916, was less than it was in 1916. The railway labor leaders, while pretending, at least, to represent railway employees who are getting 58 per cent of the advance in rates, are going to send Senator La Follette out among the farmers to yell "Stop thief!" at the railway companies. It is an old game that has been played successfully many times. The railway labor leaders played it successfully among the western farmers in 1922, as was shown by the election of La Follette, Shipstead, Brookhart, Frazier, Dill and others. Will it be successful in 1924?

There will be encountered some new obstacles. The farmers demanded legislation to help them at the last session of Congress. The railway labor leaders demanded the Howell-Barkley bill, and succeeded in pushing it in ahead of all the proposed farm legislation. The radicals from the western states supported this bill, and the labor leaders are still determined to get it passed at the next session of Congress. Now, it is not a hard matter to make a farmer audience understand the Howell-Barkley bill. The public which pays rates, including the farmers, is represented and holds the balance of power on the Railroad Labor Board which now awards railway wages. There is some chance as long as it is in existence of getting efficient operation of railways and even reductions of wages, if justifiable. The Howell-Barkley bill would abolish all representation of the public in the settlement of railway labor disputes. It would make it impossible ever to secure any changes in working conditions or wages on the railways which the railway labor leaders did not agree to, or which was not the result of arbitration to which they agreed. But so far as we know the labor leaders never in 30 years have agreed to a reduction of wages, or agreed to arbitrate the question of reduction of wages, or accepted any reduction of wages except those awarded in 1921 and 1922 by the Railroad Labor Board. The true purpose of the Howell-Barkley bill, it can be made clear to any audience of farmers, is to make it impossible to effect any change in working conditions or wages that will reduce railway expenses. With increased wages consuming 58 per cent of the entire increase in railway earnings, and increased taxes consuming another 7 per cent—a total of two-thirds—and with railway labor leaders and radical public men supporting legislation plainly intended to make impossible any future reductions of the railway payroll, the labor leaders and the radical public men they are supporting propose to go forth among the farmers and ask them to support one of these radicals, Senator La Follette, for president, to help bring down railway rates. They were able to get the farmer to entangle himself in their web in 1922. Can they do it again in 1924 after having so plainly shown their hand in the Howell-Barkley bill, which they intend to push with redoubled energy on the reassembling of Congress?

They will, we believe, have another obstacle to overcome in getting the farmer vote. The farmer has no very pleasant memories of government control of railroads during and after the war. Furthermore, he is a property owner. His farm may not be paying very well now, but he wants to keep it in the hope that later on it will pay well. In the campaign of 1922 the labor leaders and most of the radical candidates they supported did not openly advocate government ownership of railways. In the platform they adopted at Cleveland last week they declared for government ownership. A large number of those who attended the "progressive conference" were avowed socialists who advocate not only government ownership of railways, but also of farm lands, and the Socialist party later indorsed La Follette's candidacy. Thus what was charged in 1922 to be the real purpose of the railway labor leaders and the radical candidates they supported now stands confessed and avowed. In 1922 the radicals and labor leaders advocated a reduction of about one-third in the value of the railways as the sovereign means of bringing down freight rates. It was pointed out to the farmers that adoption of this method alone would reduce rates an average of not more than 5 per cent; that it would involve confiscation of one-third of the value of railroad properties as found by the Interstate Commerce Commission; that the true purpose of this policy was to force the railways into government ownership; and that it was only a part of the policy of the socialists to confiscate all property and establish a socialist state. The farmers would not listen to reason then. Who will they listen to now when the combination of railway labor leaders and socialists goes to them with a candidate and platform that not only advocate confiscation of railway property, but expressly favor government ownership of railways?

In 26 months of government operation the operating expenses of the railways were increased from $8,106,521 a day to $14,310,449 a day, or $6,203,928 a day. In the first five months of 1924, operating expenses averaged $12,550,000 a day, or $1,760,000 a day less than at the termination of government control. The great reason why railway rates cannot now be reduced is that there is still left almost $4,500,000 a day of the increase in operating expenses that occurred under government control; and as already shown, 58 per cent of the increase in rates still left is due to higher wages of railway employees. In the face of these facts, the labor leaders and their radical spokesmen intend to go to the farmers and ask them not only to vote for the Howell-Barkley bill, a measure admirably conceived to stop reductions of railway expenses and thereby make impossible further reductions of rates, but also to restore the policy of government operation under which railway expenses were so greatly increased, thereby making necessary even higher rates. Is it possible the farmers will be influenced by propaganda for such a purpose?

Meantime, what will railway employees think of the policy of these railway labor leaders? It will make it absolutely necessary to tell the farmers over and over again until they understand it, that the principal reason why present freight rates are necessary is the advances in the wages of railway employees and that 58 per cent of the entire increase in railway earnings since the rates were advanced is being immediately paid out to railway employees. The effect will be, if these facts are told to the farmers often enough, to create a strong sentiment among them in favor of reductions of railway wages. We have characterized the policy of the railway labor leaders as a combination of effrontery and folly. From a standpoint of the farmers, it is a policy of effrontery. It assumes that since the western farmers allowed themselves to be fleeced by the shell game that the railway labor leaders and radical public men played in 1922, they can again be fleeced by a still more transparent game in 1924. It assumes a degree of ignorance and stupidity on the part of the western farmers the existence of which seems doubtful. If the farmers are not the dolts it assumes they are then the policy of the labor leaders will prove to be one of folly from the standpoint of railway employees. It seems bound to array the sentiment of a large majority of the people of the country against the labor leaders, and railway employees can hardly fail to suffer from the consequences of such a sentiment.

Is the Treatment of Ties Advisable?

IS IT ADVISABLE to treat ties with preservatives to increase their life? In view of the voluminous data available on those roads which have adopted this practice extensively and the uniformity of the results which have been secured, there should be no doubt of the wisdom of this practice. The record of the Atchison, Topeka & Santa Fe, which is reported in another column in this issue and which shows a constant decline in the number of ties renewed per mile of track to an average of 128 in the more than 17,000 miles of track in that system during 1923, is indicative of the results which are being secured on many other roads as they continue this practice for a sufficient length of time to enable the results to become apparent. Yet the fact that this is not an idle question is demonstrated by the records which show that only about half of the ties inserted are treated and more than one large road is still using untreated ties largely or entirely.

It is difficult to find a proper explanation for this apparent hesitation to adopt a practice which has demonstrated its economy so strikingly. While proximity to tie supply may exert some influence, it is significant to note that the Louisville & Nashville, which penetrates the heart of the southern pine area, is a pioneer in the treatment of ties. Likewise the Santa Fe, which draws its tie supply largely from its lines in Texas, was one of the first roads to treat timber extensively. In like manner, the Northern Pacific, which still secures its ties from its own lines, has operated two treating plants for many years. A more logical explanation is the inertia regarding the adoption of new practices which is frequently found in a large organization, particularly when the *necessity* for a change is not pressing. In some instances interest in the treatment of ties and other timbers has arisen only when the adjacent supply approached exhaustion. Another consideration may be the fact that the first effect of the adoption of a policy of treating ties is to increase the cost of track maintenance by reason of adding the cost of treatment to the cost of the ties being inserted and that this added investment yields no return until after the expiration of the life of the untreated tie, although after this period has passed the return is so large as to leave no argument regarding its economy. The question is solely that of immediate first cost versus ultimate economy.

In considering the treatment of ties the railways should view the subject from the standpoint of broad public policy. As the largest organized user of timber products, the railways have a selfish interest in conserving the supply of timber and in preventing its waste, for as this supply approaches exhaustion they, in common with other users, will be forced to turn to an increasing extent to other and more expensive materials. Because of our vast timber resources originally, we as a nation have been wasteful in their use. No industry is more ruthless in the manner in which it conducts its manufacturing operations than the lumber industry. The railways and other large users have been equally wasteful in their application of this material. As a result our timber resources are being depleted rapidly, prices of timber products are rising and we are facing the necessity in the relatively near future of abandoning their use for many purposes for which they are now applied.

Because of their interest in the maintenance of an adequate timber supply, the railways should lend their support to reforestation and other measures designed to increase the supply of timber. They should also so apply that timber which they use as to enable it to render the maximum service and decrease the demand for it. This includes the treatment of ties with preservatives, which has been proved to more than double their life. With universal treatment, the demand for ties can be reduced by at least 25,000,000 annually which in itself would be a vast saving. By the extension of preservative treatment to car timbers and other lumber, similar reductions can be made. When this practice also effects large savings in expenditures, there is little room to question that the treatment of ties and other railway timbers with preservatives is advisable.

Manufacturer's Responsibility for Safety of Travel

WITH WHOM does the responsibility for the safety of railway travel lie? Obviously, it rests first and most directly on the railways themselves, for they owe it to those whom they transport to carry them to their destinations safely. But is the responsibility confined solely to the roads or do those who provide materials for this service also share this responsibility insofar as the failure of their products may endanger life? We believe that they do. While specifications should be so drawn as to exclude defective materials, there should be no conflict of interest between the manufacturer and the user in the elimination of all defective materials whose failure may endanger human life.

No material used by the railways bears a more intimate relation to safety of travel than rails. The service demanded of them is necessarily severe. Certain types of failures are dangerous in the extreme and not a few serious accidents have resulted and are still resulting therefrom. Yet, when reviewing the recent developments in the study of the steel rail problem, one is reminded of the statement about the weather, attributed to Mark Twain, to the effect that "while everybody complains about it, nobody does anything about it." No subject has been discussed at greater length during the last decade than this. It has received the constant attention of a committee of the most experienced members of the American Railway Engineering Association, assisted by a full-time investigator. Individual roads have made exhaustive studies of conditions in their own tracks. The Interstate Commerce Commission has given much attention to this subject and more recently the Bureau of Standards has undertaken its investigation. Yet in spite of this fact the problem is still with us in practically its original form.

One of the first facts which strikes one in approaching this subject is that approximately half of the failures occur in the "A" rails or the rails rolled from the top of the ingot, and that if the material which is now rolled into these rails should be discarded the failures would be cut in half. Yet this simple expedient has received little attention. The obstacle is the development of uses for the metal discarded. One suggestion referred to by Mr. Gennet in his article in another column of this issue is that this metal be rolled into tie plates. As he points out, if all of the metal now going into "A" rails were diverted to this use, it would still be necessary to use other steel to meet the requirements in full. Although this is only one of the possible outlets for this steel, relatively little progress has been made in the elimination of the "A" rails and they are still being rolled and delivered to the roads. While it must be recognized that the manufacturers are entitled to reasonable compensation for their products, the manufacture of rails should not be regarded solely as a commercial transaction in which the solution of the problem of freedom from defective conditions rests solely on the purchaser. Rather, to the extent that they fail to co-operate in developing other practicable outlets for the metal and otherwise aid in removing defective rails by

improving those processes of production which contribute to dangerous conditions in their product the responsibility for accidents rests with the manufacturers. The unity of action which prevails among the producers of rails when considering suggestions from the roads for changes in their manufacturing methods adds to this responsibility on their part. No industry has taken a more advanced position in the conservation of human life within its ranks than the steel industry. It is doubtful if as much can be said for its efforts to eliminate accidents resulting from the failure of its products—steel rails—in track. The solution of the steel rail problem has been delayed by the assumption of an attitude of conflict between the railways and the rail manufacturers, whereas this conflict in commercial interests is secondary to their mutual responsibility for the conservation of human life.

How About the Construction Organization?

RAILWAY CONSTRUCTION has such an appeal to the young man that the railroads will probably never lack for recruits for the subordinate positions in their construction engineering organizations. The immediate technical requirements are not severe—a knowledge of railroad surveying or an aptitude for the work—but usefulness in more responsible work calls for those general attributes of character which are required for advancement in any walk of life, and unfortunately railway construction by its very nature embodies certain disadvantages that militate against the development of a strong staff in the more important positions.

Construction is of a transitory nature. The construction engineer is generally denied a permanent home or a permanent position. He is required to live in out-of-the-way places and is forever exerting his utmost efforts to work himself out of a job at the earliest possible date. No more conscientious or hard working class will be found in railway service, yet a close contact with these men over a period of several years discloses the fact that their number includes a large proportion who are dissatisfied and deplore the fate that placed them in construction work rather than in some other branch of railway service.

With no thought of detracting from the work of the pioneer railroad builders, it must be conceded the problems of railroad construction today are more involved than in times past. They relate more largely to great terminals, grade revision and multiple track work in densely settled communities where land values are high and traffic is heavy. The increasing complexity of our social and business life, the intensity and multiplicity of railway regulation, calling for an elaboration of accounts, hearings before commissions, conferences with city councils, etc., all add to the difficulty of carrying on construction work in these days. Modern construction engineering imposes not only the attributes demanded of the hardy, resourceful pioneer, but calls for many other qualifications besides. He must possess untiring energy, judgment based on seasoned experience, a good business head, capacity for handling routine in a minimum of time, an uncanny ability to foresee emergencies, diplomacy in his dealings with contractors, with property holders along the line and with local and state authorities; and in addition, with the advent of scientific railroading, he is confronted with problems that call for the application of railway economics in the broadest sense. Obviously these qualities are not combined in the requisite balance in the average individual, and the railroads cannot be assured that the construction work of the future involving the expenditure of many millions of dollars will be conducted with economy and expedition unless the work of the construction engineer is made sufficiently attractive to bring forth a high calibre of recruits for the subordinate positions from year to year.

As a rule, the men in responsible charge of important railroad construction projects are assured reasonably permanent positions and as regards these men there is no essential problem. But this does not hold true of the men in subordinate positions in the construction corps, and it would be well for the railroads to take account of their construction organizations to ascertain whether they are building up candidates to fill vacancies in the key positions as they occur, for it is in these minor positions that the work is so largely of a distinctly temporary nature.

The solution of this problem is not simple. The prosecution of construction work according to a general program providing for a continuation of work from year to year represents an ideal that is not easy of attainment. Some railroads provide for the transfer of men from the maintenance to the construction department and vice versa, but here again definite limitations are imposed. Notwithstanding these difficulties, the problem of the construction engineer and the importance of a strong construction staff merits thorough consideration by railway managements, and at this time when pressure is being put on the heads of all departments to reduce payrolls, some weight may well be given to the needs of the future.

Books and Special Articles of Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Financing Agricultural Exports from the United States, by G. W. Edwards. Bills of lading of various kinds, p. 13-17, barter arrangements, p. 35-37. U. S. Dept. of Commerce Trade Information Bulletin No. 241. 46 p. Pub. by Govt. Print. Office, Washington, D. C.

Survey of Original Sources of Railway Information. 48 mimeo, p. Issued by Library, Bureau of Railway Economics, Washington, D. C.

Trade, Tariffs and Transport in India, by K. T. Shah. Author is Professor in Univ. of Bombay. Chapter 16 discusses Indian Railways and the economics of railway transport. 450 p. Pub. by National Book Depot, Bombay, India, and P. S. King & Son, London, Eng.

Periodical Articles

Are the Railroads Beating the I. C. C. to It? by A. M. Sakolski. Discusses progress of consolidation. Magazine of Wall Street, July 5, 1924, p. 329-331, 401-403.

The Corn Belt Twins. Corn and Hogs Belong Together —and the Packing House Should Come to the Pig, by L. J. Dickinson. "One of the biggest advantages of a greater decentralization of the packing industry is the elimination of the long railroad haul." p. 7. Country Gentleman, July 5, 1924, p. 7, 22.

"Let's Try Goin' Along With 'Em," by Whiting Williams. Discusses B. & O. plan for co-operation with shop employees. Collier's, July 5, 1924, p. 11-12.

Teapot Domes of the Past, by Will Payne. Events of the Crédit Mobilier investigation of 1872. Saturday Evening Post, July 5, 1924, p. 23, 102-110.

Tunneling to Empire Through Continental Divide, by Wyman S. Smith. The Moffatt Tunnel in Colorado. Forbes Magazine, July 5, 1924, p. 428-431.

Letters to the Editor

[*The* RAILWAY AGE *welcomes letters from its readers and especially those containing constructive suggestions for improvements in the railway field. Short letters—about* 250 *words—are particularly appreciated. The editors do not hold themselves responsible for facts or opinions expressed.*]

More About the Shipper and Depreciation

NEW YORK.

TO THE EDITOR:

The letter in your July 5 issue, "The Shipper's Interest in Depreciation," attempts to prove that it is to the shipper's interest to oppose the charging off of depreciation by pointing out that when a sum, say $1,000, is charged off, the railroad loses only $57.50 (reduction in "fair return") while the shipping public loses $942.50 (the increase in revenue necessitated by the $1,000 charge). This seems to be correct; revenue must be increased by $1,000 and decreased by $57.50 But the fallacy lies in considering only the one year, the year in which the charge is made. The $1,000 increase in revenue occurs but once; the $57.50 decrease in revenue is a permanent annual saving to the shipping public. They pay $1,000, and get in return a reduction in freight charges of $57.50 per annum, a return of 5¾ per cent on the investment. What could be fairer? Any individual shipper, of course, is currently paying his share of a large number of such $1,000 charges, but is participating in the benefit of the reductions in rates due to all the depreciation charges that have ever been made. As the Interstate Commerce Commission correctly states (as quoted in the letter) "it is of no great importance" to him; in the long run, of no importance at all.

Carrying the charging of depreciation to an extreme, consider the situation when a sum equal to the original cost of the road has been charged off. The valuation then is theoretically zero, the "fair return" is also zero—the investors having gotten their money back—and the shipping public thereafter pays freight charges equal only to the operating expenses. They have virtually bought the road from the original investors and get the return on their investment in the form of reduced freight rates. R. S. R.

The Value (?) of Government Accident Investigations

MANHATTAN BEACH, N. Y.

TO THE EDITOR:

If you wish to get your mind off from railroad topics for a brief season go and sit by the sea. The boundless ocean, if allowed to have access to your soul, will drown out your dusty ideas of work and duty, and your mind can recuperate. Coney Island is not made up wholly of bathing beauties, merry-go-rounds and ice-cream cones; it gives you an outlook on the great world. With a little imagination you can see Cuba and the Azores. If you are still impervious to the vast wonders of nature, look at the Leviathan, as she sails out for Europe, with 3,000 souls aboard. There you can get "human interest" and still shut your eyes to roadbeds and bridge strains, the Interstate Commerce Commission and Senator Brookhart.

But when you want to get back to familiar ground and forget the distractions of world-wide activities, go back to your first issue in July (July 5, page 11) and read again those four pages of government accident investigations that you then gave us. There you will find real life; and of a kind which can be understood without any preliminary instruction. Just before seeing that article I had been reading the account (May 3, page 1096) of the collision on an interurban line at Ingalls, Ind., where 16 passengers were killed, and possibly I may be in a hypercritical mood; but I don't think you will ask me to apologize as to moods; look at the facts.

Looking at that elaborate catalog of unsafe practices, and bearing in mind the many similar documents that have been issued by the Interstate Commerce Commission since 1902, the reader very naturally queries whether the governmental publication of these train accident investigations is not coming to be a pretty monotonous proceeding; whether these reports are not utterly useless *so far as any good results can be seen.* There must be some invisible results; it cannot be that collisions go on killing scores of people every year (and injuring many hundreds) and nobody cares; but what one would suppose ought to be the normal result of such publications—definite improvement in regulations and practices—is nowhere to be found. It is to be presumed that the government might find by special inquiry some changes in practice introduced because of its expositions and admonitions, but there is no evidence that it actually does find any. On the contrary each new report exposes conditions which seemingly indicate that things are going from bad to worse.

That account of the collision at Ingalls discloses a condition that is almost unbelievable; a surprising account of varied unsafe practices, calling for very pointed official condemnation. This case, indeed, was on a trolley road, and it is to be hoped that no standard railroad, even the poorest, would show any situation quite so bad as that here reported; but that six-months' record of collisions on the steam railroads, constitutes a sufficiently sobering picture of American single-track practice, without reference to the trolley roads. Six of the 27 collisions, occurring in six states—Arkansas, Colorado, Georgia, Kentucky, Mississippi, Tennessee—make up a story of loose practice, on prominent railroads, evidencing an apparent disregard of the value of human life, which should give pause to every thoughtful railroad officer.

This record of "safety first" turned upside down, ought to be well pondered by every railroad commissioner, congressman or other person who keeps his mind principally on the big roads and who has educated himself to believe that the introduction of some automatic electric contrivance, evolved in the patent office, is all that is needed to put American railway travel on a safe basis. Anyone who complacently rests in the assumption that a ten-years' discussion of different ingenious schemes for automatic train control is going to do away with all of our troublesome questions about collisions should revise his views at once.

These six cases are those in which the need of block signals is the main point to be stressed; but the 21 other collisions investigated during that half year afford varied and striking lessons of the same general nature. And the issuance of these object lessons from Washington has been going on now for years. Who heeds them? For more than a dozen years the Interstate Commerce Commission has published annually the aggregate mileage of railroad equipped with block signals, and a few roads, reading the handwriting on the wall, did extend the operation of the block system when those mileage statements became forceful; but except for this one feature, the arguments and exhortations emanating from Washington seem to have had no effect; and, as I have said, the impression one gains

today is that these regularly issued reports of detailed inquiries—104 of them in 1923—now fall mostly on deaf ears.

The facts of this situation should serve clearly to emphasize the duty of the Interstate Commerce Commission to pursue two major lines of inquiry; (a) as to the safety of fast and heavy passenger trains on well signaled lines—that is, the problem of the automatic stop; and (b) as to the safety of trains generally, everywhere; the problem of the adoption of the block system, or the efficient operation of that system where (as seems to be common) it is entrusted to incompetent employees and dropped out of mind by the officers.

The first of these two lines of inquiry is being followed with more or less zeal; but what can be said concerning the other, involving probably more lives and more money? Is any progress whatever discernible?

Must not every railroad officer admit that here is a situation in which our boasted quest of uniformity and good practice has left a good many loop holes unprotected and that the government has a right to step in? V. P. O.

The Positive Meet

CEDAR PLAINS, Conn.

TO THE EDITOR:

I have been reading your editorial of May 31 on the Standard Code of train rules, in which you seem to intimate that that committee of the A. R. A., which lacked the courage to recommend the positive meet, was rather slow; but are you not somewhat ultra conservative yourself? You do, indeed, favor the use of the positive meet, but what progress do you expect can be made when you turn off such a big subject in a single paragraph of a dozen lines?

The use of right by direction is a relic of the ancient days when there was no telegraph line, or if one existed, the hidebound superintendents, who had not waked up sufficiently to appreciate its value, allowed the wires to hum idly in the wind while their delayed trains were helped out by means of messages carried by a flagman, traveling on foot; or, in rare instances, on horseback. Such moss-covered practice today is a most grotesque anachronism. It is time that the argument for safer and more convenient practice be pressed for attention until operating officers begin to sit up and take notice. I have called the former generation of operating officers hidebound; but in many ways they were exceedingly enterprising—such is the inconsistency of human nature; whereas the hidebound-ness of today is a sin against light.

The way to get out of the old ruts has been marked out, as plain as day, and neglect to act is a definite waste of money. Continuing the present general single-track practice is like continuing to use black dirt in the fire box when there is plenty of good coal available; or like allowing a brake to stick in a long freight train, and not doing anything about it. Progress is being retarded, yet all hands are shutting their eyes to what is really a definite loss.

If I understand aright what the officials of the New Haven road say in regard to the positive meet, they have history and experience, as well as theory, to justify their position. The road operates about 1,100 miles of single track; no one can say that their experience is too limited to be instructive. The abandonment of right by direction was forced upon them, some 25 years ago, by the delays and costs incident to the old practice. They say that today a return to right by direction would necessitate the shortening of dispatching districts. Parenthetically it may be observed that some of the conservatism which makes roads stick to the old method is based on a feeling that a change might possibly throw a dispatcher out of a job here and there.

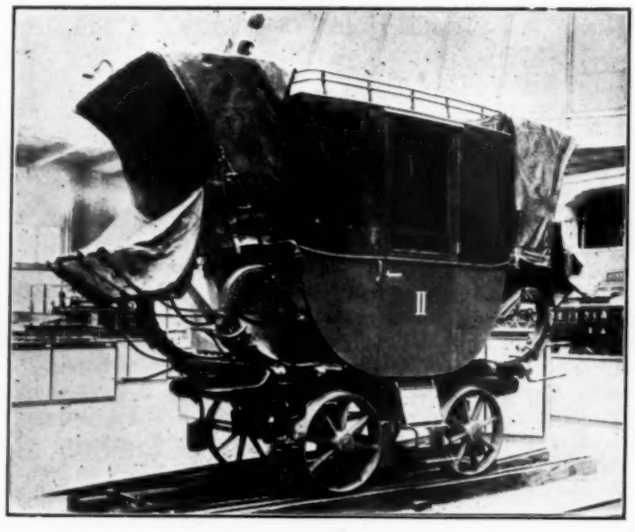
The New Haven road had very little trouble from lack of telegraph facilities when the wires were down, in November, 1922, because of a sleet storm, though some divisions of the road were without satisfactory telegraph service for three weeks.

The fear of wire trouble seems to be practically groundless. Surely, with telephone wires covering the country like a cobweb and the radio enthusiasts promising to develop anything that a railroad can ask for, no enterprising railroad officer can reasonably defer this useful improvement simply because of possible interruptions of train service once in five or ten years.

It is only by a careful study of the government accident records that one can come to realize the great variety and the comparative frequency of errors committed in reading watches, computing time, checking schedules in the time table and executing other tricks made necessarily the rule of "right by direction." There is a considerable aggregate of such cases, and if all which have been investigated by the Interstate Commerce Commission in ten years could be set forth in a single statement, no reasonable person could withstand the argument for the positive meet.

The time-order has been called the Devil's own handiwork, and no unprejudiced person will deny the appropriateness of the title. The New Haven practice, if generally adopted would not only defeat the Devil (in this particular detail) but would lead to the abolition of another nuisance—not exactly devilish, but sometimes nearly as annoying—the interminable discussions of train rules and dispatchers' puzzles printed in the brotherhood magazines. These discussions probably do more harm than good.

And I may add that the puzzles in the magazines are not the only unnecessary element of confusion now burdening the freight conductor's life; there are some quite elaborate puzzles for which the railroads themselves are responsible, namely, the innumerable notes at the bottom of the time tables suspending, for certain trains, the normal right by direction. If westbound trains are superior, and if your train, eastbound, is permanently excepted from that rule (because you carry certain important traffic) and if then, occasionally, you are made inferior to westbound trains, who can be surprised if, some day, somebody gets things a trifle mixed and makes a mistake? PROFESSOR.



Keystone

Railway Car Used in Austria in 1828

Second Prize Paper in Co-operation Contest

W. C. Barrett, Lehigh Valley Trainmaster, Awarded Prize for Paper Stressing Education

The winner of the second prize in the Railway Age's contest on co-operation is Walter C. Barrett, trainmaster of the Lehigh Valley, with headquarters at Sayre, Pa.

Mr. Barrett was born on October 3, 1875, near Hillsboro, Highland county, Ohio. He studied at Wilmington College, Wilmington, Ohio, and Earlham College, Richmond, Ind., receiving the degree of bachelor of science from the former institution. In 1899 he entered railway service as an assistant in the engineering department of the Pennsylvania, Lines West, at Richmond, Ind. In 1902 he left the service of the Pennsylvania to enter that of the engineering department of the Wheeling & Lake Erie at Cleveland, Ohio. A short time thereafter he entered the service of the Baltimore & Ohio in the maintenance of way department. He remained with this company until 1912, six years of his service having been in the capacity of division engineer. From 1912 to 1914 Mr. Barrett was not in railway service, but he returned on July 1 of the latter year as division engineer of the Lehigh Valley at Sayre, Pa. In July, 1920, he was promoted to trainmaster with the same headquarters, the position he now holds.

Mr. Barrett's prize-winning contribution follows:

W. C. Barrett

PSYCHOLOGISTS tell us that the normal order of performance in the activities of children is, (1), do; (2), feel; (3), understand, but that in adult life the order is reversed and is, (1), understand; (2), feel; (3), do. Is it not possible that in our dealings with our employees on the railroads we may have too often considered them not adults but children and insisted on their functioning as such; consequently, expected them to "do" as they were told and ask no questions; then wondered why they felt so out of sorts with us about the job and why they did not understand the good intentions and kindly attitude of the company toward them?

I believe that the whole problem of the relations of the employer to the employee is contained in this one psychological precept just quoted. Enforced in the childish way, it is bound to breed misunderstanding, discontent and discord. Used in the grown-up, manly way, it will mean understanding, contentment and loyal, efficient performance. Suppose we analyze the precept and see if we can get the full meaning of its psychology.

First, understand. Explain fully to the employee the reasons for wanting him to do the specified task, in the stipulated way. Take him into your confidence. Show him the reasons for the various activities and processes which go to make up the finished performance you desire. Treat him as a man who is grown up and able to reason, not as a child, unable to reason or incapable of reasoning. Men grow strong by being trusted and expected to know how to do, and by being considered of sufficient intelligence to be told the reason for doing. There are perhaps some men who cannot understand, whose grade of intelligence is too low to enable them to understand. These can be located and put where their work will fit their intelligence and this very plan is being followed in some industries today. Why not try it in the railroad business?

What is it we want and are trying so hard to get in the railroad game today, not only with our employees but with the public? Is it not after all, understanding? A realization of the real problem before the railroad companies; a proper knowledge, first and necessarily first, on the part of our employees, of what we have in mind to do for the public, and then the same understanding and knowledge on the part of the public? I believe that that is what we want—what we must have to be successful, to avoid criticism and possible serious political interference with our plans.

How then can we get understanding on the part of our employees? By education; by giving them the proper knowledge of our plans and showing them how to use this knowledge to carry forward our program. How can this be done? Will it be expensive? Will it pay? Those are fundamental and vital questions. Some things which can be done are too expensive; some expensive propositions are worth the cost and others are not; but I believe that this program of education can be carried forward at small expense and that it will pay and *pay big*. The details of such a program will vary, of course, on different railroads, according to the business program and the character and environment of the employees. As a general plan, I would suggest an organization with and a part of the personnel department. Through this department information as to the business and the program of the railroad for getting and handling business could be disseminated. I would suggest a library of the railroad and its past history and organization, men, material and everything that could be collected which would enable an employee to know more about the railroad for which he was working or for which he expected to work. This exhibit to be under the care of a competent librarian who was also a skilful teacher. All examinations for employment or for promotion would be

held at this point, and a part of the examination would be a study of the fundamental facts about the railroad itself; these facts set forth in interesting and instructive manner, so that no employee need be ignorant of the history and organization of the company for which he worked.

In order to keep the information concerning the railroad and its activities up to date, the secretary of the company would supply the library with information as to any and all corporate changes, with any and all statistics which in any way might contribute to the proper knowledge the employee was entitled to have.

The traffic department would supply the library with statistics of traffic; what it was; where it originated; why it was necessary to have it classified and handled in the proper manner, and any and all statistics which an employee needed to know to enable him to grasp the traffic needs and requirements of the community his railroad served and the part his company must play in the transportation business to keep it properly functioning.

The transportation department would supply the library with all the live, up-to-date statistics of operation; what we did yesterday; what we did last week; what we did last year; what we are doing today; what we must do tomorrow and what we are expected to do next week and next year. And why we must and are expected to do these things; what it cost us to do the business last week and last year; what it costs us now, and all the details necessary to a proper understanding of the railroad's problem from a transportation standpoint. The library would be really a school room, where accurate knowledge of the company and its problems could be gotten by any and all employees. There would then be no possible excuse for employees, as at present, giving to the public erroneous, unfair and in many cases really harmful information.

Is the idea fanciful? Is it impossible or impracticable of accomplishment? Would it be excessively expensive? To all of these questions I answer, "No." Would it pay? I believe it would. How, and why do I so think? The answer is in the second part of my first psychological precept, "feeling." We are contemplating the education of our employees in the things having to do with the functioning of our own railroad, so that they may have the proper state of mind toward their work and the right feeling in their hearts for the company they serve. "For with the heart, man believeth unto righteousness."

Our general educational program has shown our employees *why;* our next job is to show them *how.* And on our method of thus showing them depends the feeling they have toward the company; so we need to educate our foremen and subordinate officers in the art of showing men *how.* I believe the failure of many of our former plans and programs for educating employees and thus getting their good will has been due to our neglecting and often entirely overlooking the first requisite of proper knowledge, the knowing of the *why* of performance before the *how* can be rightly learned. We have in this program taken care of that feature; the proper foundation is laid. We can therefore properly hold our foremen and supervisory officers responsible if the *how* is not properly and intelligently taught and willingly and even enthusiastically received.

The imparting to the employees of the knowledge of *how* to do things involves also a program of education; the education of the foreman in the necessary details of the work he supervises, but more necessary perhaps even than that, in the art of handling men—the personal equation.

Possibly we need also a school for foremen—where they can get thorough and intelligent instruction as to the policy of the company and its purposes and plans for its employees and their welfare in relation to the company's business and the successful operation of the plant; where they can meet the higher officials, know them and get their viewpoint and their ideas on the handling of employees. It is vitally necessary to the proper handling of employees that there be a definite policy, easily understood and defined, running through the entire personnel, from the highest official to the lowest employee, if any progress at all in employees' relations and employees' welfare is to be successfully made. Foremen and subordinate officials should know this policy, believe in it and be enthusiastically for it, or it cannot be put over to the men under them.

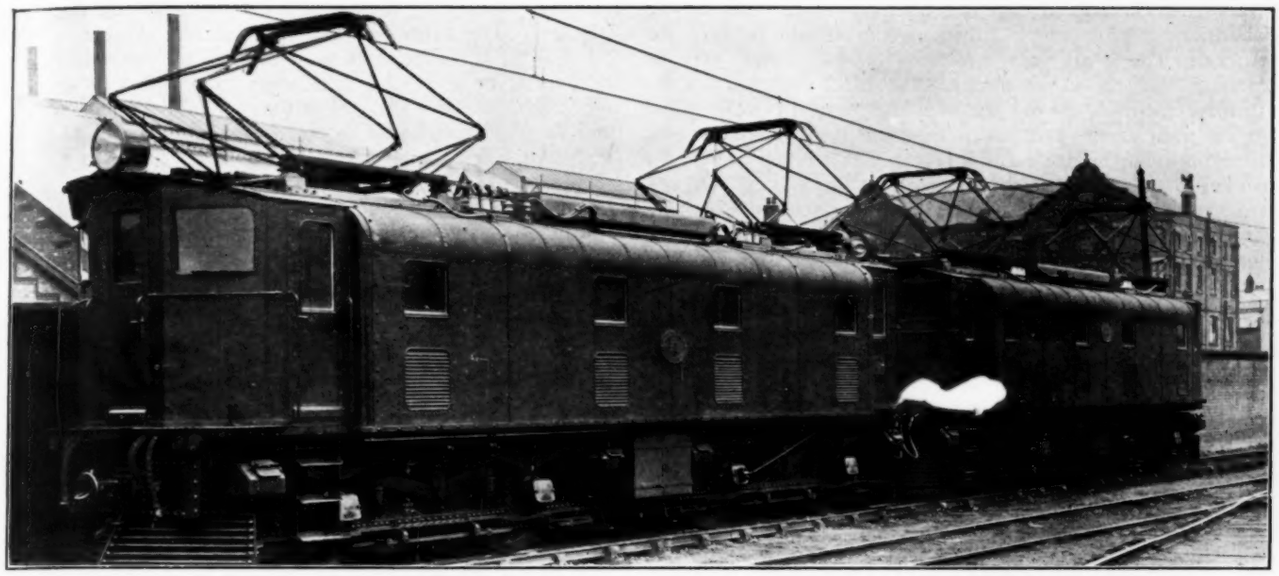
So many volumes have been written and so much has been said about the relations of the foreman and his men that it seems unnecessary to repeat here, but one or two fundamentals should be mentioned. First of all requisites for a successful foreman—and it really embraces all—is *absolute honesty,* such honesty as knows neither race, creed, color or condition; honesty which knows no favorites and recognizes no enemies. Second, and a part of the first requisite, *integrity* of thought, word and deed; knows not even a thought of ill and makes no promise he does not fulfill.

Can we see what a tremendous part our foremen play in any scheme or plan for employees' co-operation with employer? Do we carefully and thoughtfully enough supervise the selection of men for the duties of foreman? I fear not. Do we not too often measure the ability of a foreman solely by the *output* of his gang in units of material or labor and overlook the surer and more accurate measure of the final profit to the company because of the employment of these men? True, output is the usual measure of the ability of a man, but quality counts in the final analysis as against quantity, and quality comes only through the right attitude and right feeling of a man for his job. If he looks upon his work not as a piece of drudgery, which he must do to get a living, but as his part in a great program of constructive effort to enrich and make more pleasant life here on earth, for himself and his family and for the whole world, it becomes a labor of love and, because it is such, will be nobly and worthily done; and the doers of such work look not alone for their reward in money, but receive much of their pay in the satisfaction of work well done and rest well earned.

But we must not forget the third part of our psychology—the doing. Having learned the why and the how, we are anxious and ready to do, and our doing should be worth while.

This brings us to what to my mind is one of the real stumbling blocks in the way of employer and employee—co-operation; the impossibility of proper compensation for good work, well done, and the requiring of improper payment for poor work, badly done. Not until we can properly compensate for superior work, make unusual and unsolicited service worth while, will we have a fundamentally sound basis for real co-operation. Is this a problem that can also be solved by education? I think it can, but not entirely in the school of the employer; there must be co-operation on the part of the school of the employee—the place where he gets such a large part of his knowledge and is taught so much that influences his attitude toward his life and work—the labor organizations.

I would not be misunderstood. I would not criticise; I would only suggest. Is there not room in the program of every proper organization, be it of capital or labor, for the principles of efficiency and co-operation? Should not the laborer be worthy of his hire? And does not that principle, enunciated by the Master Teacher, in the long ago, mean the same today as it did then; that as a man and as a producer, the laborer should be *worthy* just as truly as it means that the *hire* must also be in keeping with the *worth* of the service? And is not that the goal toward which we are all striving—each worthy of being a co-worker with the Almighty in his program here on earth and each receiving compensation according to his worth? Is such a vision only a mirage? I think not. When we understand, as we may; feel each for the other as we should, we will do the task assigned us, as only brothers would.

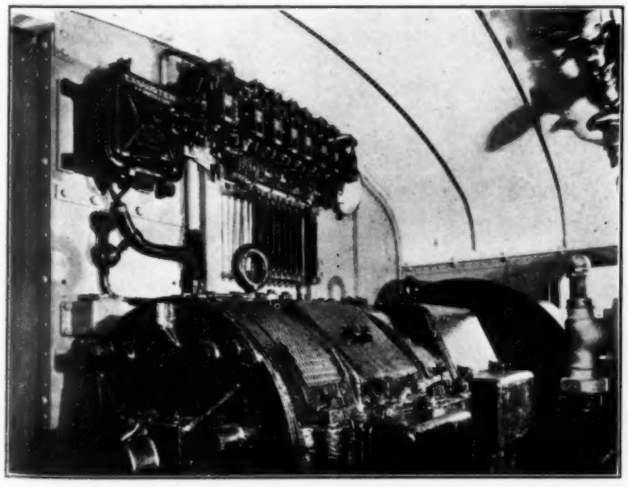


Locomotive Made Up of Two Motive Power Units

Electric Locomotives for South African Railway

Three Motive Power Units Will Be Used to Haul 1,430-ton Train on Road Having 3 ft. 6 in. Gage

ONE OF THE LATEST developments in main line railway electrification is that of the Glencoe to Pietermaritzburg section of the South African Railway. The section which is being electrified will have to deal chiefly with the h uling of heavy mineral traffic down to the coast.



The 28 kw. Motor Generator Set and Contactors

The track has a route mileage of 171 miles traversing very hilly country with long and difficult grades. It reaches an altitude of 5,000 ft. above sea level and runs down to the 2,200 ft. level at Pietermaritzburg. In this latter portion of the line there is one grade which drops over 1,350 ft. in a distance of 14½ miles.

The overhead contact wire system is used at 3,000 volts, direct current with the standard track return. The power is converted at substations along the line, which are supplied by a three phase overhead transmission system at 88,000 volts, 50 cycles.

In connection with this project the Metropolitan-Vickers Electrical Co., Ltd., are supplying seventy-eight combined passenger and freight locomotives.

In view of the limitations of the track, such as the gage, a minimum radius of curve of 300 ft. per axle, and the very heavy trains that have to be dealt with, a single locomotive unit is unsuitable. Consequently, three motive power units are coupled together, driven in multiple, and controlled from one driver's cab. In normal working three units haul a freight train of 1,430 short tons to Pietermaritzburg, and on the return journey one of 700 short tons. Wherever control of speed on a down grade is necessary, this is done by the regenerative action of the locomotive alone.

GENERAL DATA FOR MOTIVE POWER UNIT

Weight in working order	149,200 lb.
Weight of mechanical portion	88,256 lb.
Weight of electrical portion	60,928 lb.
Type of locomotive	A.A. + A.A.
Gage	3 ft. 6 in.
Motor equipment	Four 300 hp. motors
Total motor rating	1,200 hp. one-hour rating
Tractive force, full field	21,200 lb. one-hour rating
Tractive force, maximum	40,000 lb.
Tractive force, full field	16,400 lb. continuous
Speed, full field	21.5 m.p.h.
Speed, full field	23 m.p.h. continuous
Maximum safe speed	45 m.p.h.
Traction system	3,000 volts, D. C.
Brakes	Compressed air operated
Overall length	43 ft. 8 in.
Overall height of body (pantagraph down)	12 ft. 11.3 in.
Overall width of body	9 ft. 2.25 in.
Diameter of driving wheel	4 ft. 0 in.
Fixed wheel base	9 ft. 3 in.
Total wheel base	30 ft. 11 in.
Distance between bogie centers	21 ft. 8 in.
Weight per driving axle	37,296 lb.

Mechanical Features

The body of the locomotive containing the electrical equipment and auxiliary gear is supported by two four-

wheel trucks coupled together at their inner ends by an articulating joint, which allows free movement between the trucks. The draft gear which is of the central type is mounted directly on the trucks. The truck center pivots are in three castings, the top one of which is steel rigidly bolted to the underframe and has a spherical seating which rests in a phosphor-bronze rubbing plate. The latter is held by a steel casting bolted to the truck center stay plates. On one truck the rubbing plate is held firmly in the truck casting and on the other it is free to move longitudinally. This feature is introduced to compensate for the varying positions of the trucks on curves. The body is relieved of all draw and buffing shocks since these are transmitted directly through the truck frames and the articulating joint. Steadying of the body and the trucks is carried out by side and end bearers which are spring-loaded.

The trucks are of frame plate construction arranged with top and bottom stay plates at the ends and center. The transom besides supporting the truck center casting also carries the motor nose suspension brackets. The bearing springs are of the laminated type with adjustable links and are placed above each axle-box. Compensation is provided for by beams pivoted on knife edges, which are attached to the centers of the truck frame plates.

The body of the locomotive unit is divided into five compartments. There is a driver's cab at each end containing all the necessary control gear, meters, gages, brake valves, etc., with which to control the locomotive. Each cab is connected by a corridor running along one side of the locomotive. In the center is situated the high tension compartment containing all the high voltage control gear. Access from the gangway is obtained by a sliding door which is both mechanically and electrically interlocked to prevent it being opened while the pantagraph is up. The spaces between the high tension compartment and the cabs at each end are occupied by the auxiliary gear which includes two motor generator sets, each coupled to a blower, a compressor, exhauster, reservoirs containing air for the brakes, low tension control gear and pantagraphs, and low tension switches, and contactors for controlling the auxiliary gear. The sections of the roof above these compartments, and the clerestory roof above the high tension compartment are easily removed to lift out the heavy machinery and control gear.

The vacuum brake system is used on all the rolling stock, the locomotive brakes, however, are operated by compressed air, this system being found to be more suitable under the circumstances. By means of a vacuum operated air valve application of the vacuum brakes will produce a proportional braking effect on the locomotive. For switching purposes the driver has a compressed air brake valve which only applies the locomotive brakes. Air connection between locomotive unit is arranged in the main reservoir circuit to supply air to another unit in the event of failure of its compressor.

Sanding is arranged for multiple control, the sander valves are electrically operated and their control wire is included in the train line bundle, thus all locomotives when coupled in multiple sand simultaneously.

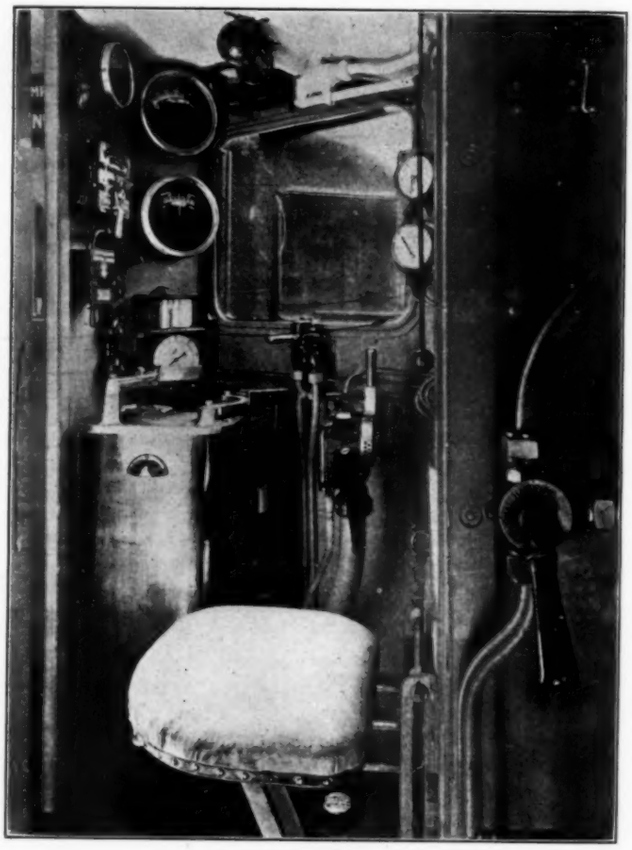
Main Motors

The four driving motors in each unit are of the series wound type and are arranged for operation with two connected permanently in series, thus having 1,500 volts per commutator. The motors have been designed to give the maximum output on 3,000 volts and are rated at 300 h.p. with full field on the one hour test basis, corresponding to a speed of 21.5 m.p.h. with a gear ratio of 17/75 and 48-in. diameter wheels. The magnet frame is cast in one piece and is practically octagonal in shape. The suspension of the motor is carried out by means of the usual axle bearings and from a nose on the other side of the motor which is supported on rubber springs held in the suspension bracket on the truck transom. The motor is a four-pole machine with interpoles; a tap is made on the main field winding to give reduction in excitation for maximum speed operation. Inspection covers are arranged above and below the motors at the commutator end to give accessibility to the brushes which can be easily inspected when the motor is in position.

The motor is arranged for forced ventilation. Air enters the motor at the commutator end through a flexible air duct leading from the blowers, and flows in parallel paths, through the machine leaving by means of openings at the pinion end.

Control Gear

Each locomotive has two pantagraph current collectors which are pneumatically operated. Spring control ensures that a uniform contact pressure is maintained with varying



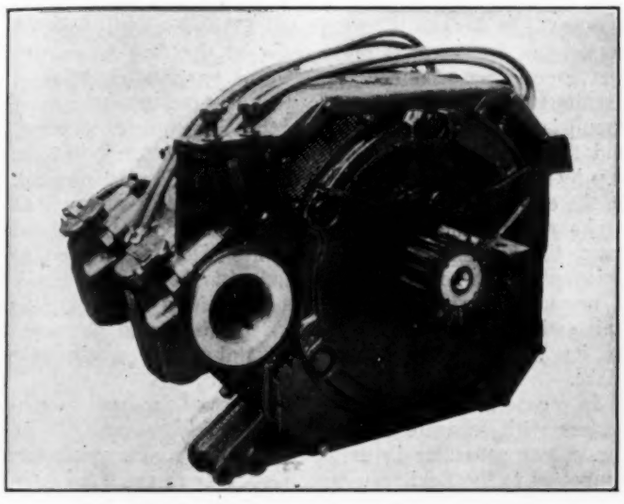
Operator's Cab

heights of the trolley wire. The whole pantagraph framework is carried on four insulators which are supported on the roof by heavy brackets. Air is fed to the pantagraph cylinders through an electrically operated valve which is controlled by a two-way switch in the driver's cab. The pantagraph control wires run through the train line bundle so that the driver has complete control over all pantagraphs from one cab. Each pantagraph is capable of collecting the current for all the motors, therefore it is only necessary to have one up at a time, the other being used as a stand-by.

Current is led through to the main equipment by way of the main isolating switch which is situated in the high tension compartment. The compartment door is interlocked with this switch, and the pantagraph air circuit in such a manner that it is impossible to enter the compartment when the equipment is alive. The isolating switch is connected through a trolley overload trip to the control equipment. The line and resistance switches which are pneumatically

operated have a contact pressure on normal working of 140 lb. To ensure a high speed of break the piston closes against a heavy spring. All the parts of the switch which carry the main current are insulated for a working pressure of 3,000 volts to ground. These switches are arranged in two groups of ten and eleven respectively, along the longitudinal center line of the locomotive. In the center of the compartment are the cam operated switch groups. These switches are operated by a double ended piston carrying a rack which engages on a pinion fixed to the end of the camshaft. The cam groups are used for the motor combination, forward and reverse, motoring and regenerating, and the weak field connections.

In every possible case the switch to switch and to resistance



One of the Main Driving Motors, Pinion End

connections are made with bare copper rod or strap, thus occupying the minimum space, and eliminating fire dangers. The high tension cables are enclosed in steel conduits affording sound mechanical and fire protection.

Arranged above the unit switches are the resistance frames. They are of the cast grid three point suspension type and the pressed steel type, the latter being used for the stabilizing resistances and for the earlier steps of the accelerating resistance. The grids are carried by three insulated bars which are held by insulators in the end frames, a further factor of safety is introduced by insulating these frames from the supporting beams. The control wiring is carried in special troughing which runs behind the switches.

The high tension compartment also contains electro-magnetic contactors for starting up the motor generator sets. The auxiliary fuse groups which are of the expulsion type and are graded in steps with suitable resistances, motor overload and overvoltage relays which operate an auxiliary relay connected in the control circuit of the resistance switches, stabilizing resistances and switches, and all other high voltage gear.

The master controllers which are situated in the drivers' cabs have three independent drums on one central spindle. These drums are used for the motor combinations, series and parallel in forward, and series in reverse, acceleration, and regeneration respectively. Complete mechanical interlocking is adopted, no blow-out coils are required since the currents used for energizing the magnet valves are extremely low and the control is on a 100 volt circuit. All wires from the master controller connect to a terminal board at the back of each cab, the boards are connected together by two train line bundles and are each connected to four jumper receptacles which are carried at the ends of the locomotive on the under-frame. The control equipment can be completely isolated by a multi-point cut-out switch which is connected between the main terminal boards and the control equipment. Defective motors are cut out by motor cut-out switches connected in the control circuit.

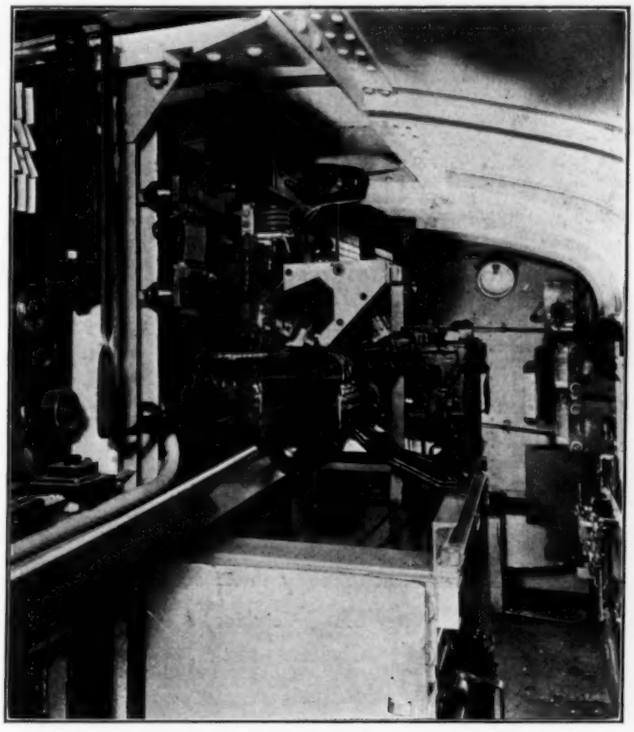
Complete lighting is installed and is supplied from the 100 volt circuit which is fed by a 16 kw. generator in parallel with a 100 volt battery. The latter is carried on the outside of the locomotive in two boxes suspended from the underframe between the trucks. The locomotive carries a high powered head light at each end.

Auxiliary Gear

There are two motor generators of 16 kw. and 28 kw. capacity respectively.

The 28 kw. set is used for exciting the fields of the main motors when in regeneration. The motor and generator are mounted on a common shaft to the end of which is fitted a blower fan supplying air to two of the main motors. The motor has a shunt holding winding connected across the low tension supply while the generator has a shunt winding in series with a regulating resistance which is cut out step by step by electro-magnetic contactors actuated by the regeneration drum on the master controller, the winding being connected directly across the low tension generator.

The 16 kw. set is used for supplying the control circuits, lights, exhauster, compressor, exciting the larger generator,



High Tension Chamber Showing Cam Group in Position

cab heaters, and maintaining the battery on charge through an automatic battery cut-out switch. On this machine, the motor and generator frames are separate but stand on the same bedplate. A fan is connected to the end of the motor shaft supplying the remaining two main motors with forced ventilation.

The two motor generators are connected in a series with starting resistances connected through a double break contactor to the 3,000-volt auxiliary fuses and thence to the main switch. The starting resistances are short circuited by a contactor operated by a current relay set to close when the motor current falls to a fixed value. It is possible to cut out the larger set but in this case interlocking is so arranged

to prevent regeneration. Normally both sets are always running.

The compressor is of the horizontal two-cylinder type driven through gearing by an 8 h.p. series wound motor. The set is switched into circuit through a starting resistance, to prevent series fluctuations by a contactor operated through a time lag relay. Simultaneous control of all compressors when in multiple is obtained by a synchronizing wire connecting up the compressor governors which are connected in the control circuit. The compressors supply air to the brakes, sanders, tyfon horns, control gear and pantagraphs.

The exhauster is of the rotary drum type direct coupled to a series wound motor with tapped field. The motor is rated at 4 h.p. at 1,400 r.p.m. and at high speed 6 h.p. An electro-magnetic contactor operates the field tap and is in turn actuated by a switch which is closed when the vacuum brake valve is in release.

Both the compressor and exhauster motors are connected

View Along Corridor

across the low tension supply and are switched into circuit through double pole switch fuses.

Operation

The control is arranged for series and parallel in a forward direction series in reverse and series or parallel in regeneration.

The positive feeds to all switches and to the exhauster control circuit and sanders pass through the combination drum of the master controller which is operated by the driver's control key. This feature ensures that one man only has complete control of the locomotive when made up of more than one unit. On the first notch series three line switches close, and connections are made for motoring with the four motors in series and all resistance in. The control interlocking is so arranged that the cam groups must throw to their correct positions before the unit switches close, thus preventing the possibility of the cam switches breaking any current.

The resistance is cut out step by step by moving the accelerating handle to the consecutive notching points on the acceleration sector. This accelerating handle is arranged with a detent and lever, a slight pressure on the lever withdraws the detent from the slot in the notching plate. Upon releasing the lever the detent automatically engages on the next tooth. The slightest pull on the handle moves it forward until the detent automatically engages in the next slot. This feature greatly facilitates an accurate notch to notch movement of the handle without necessitating excessive care on the part of the driver.

The control circuit interlocked to prevent starting in motoring with parallel connections. To take transition the combination handle is moved to the parallel position, no change of connections taking place. All resistance is inserted by moving the accelerating handle to the first notch, the cam group then commences to throw to parallel, it short circuits two motors and its travel is arrested until the short circuit is opened by a unit switch, then it completes its travel and the parallel switches close. The resistance is cut out step by step as before and weak field can be taken if desired. In the event of an overload, the trips immediately insert two banks of resistance, the resistance switches drop out and insert the remainder of the resistance after which the line switches break the circuit. To stop, the accelerating handle is moved to the "off" position thus opening the remaining unit switches and the combination drum has to be moved to its series position before notching can again take place.

In regeneration all the four main motors are used as generators with separate excitation. For this purpose the 28 kw. motor generator is used. By means of the contactors connected to the field regulating resistance of the 2 kw. generator, thirteen different steps of voltage are obtained under the control of the regeneration handle on the master controller.

To obtain stability under conditions of fluctuating voltage a stabilizing resistance is used in conjunction with the above arrangement.

The driver is able to come into regeneration either with his motors connected in series or in parallel the former over the lower ranges and the latter for the higher ranges of speed. When regenerating all resistance is inserted in the motor circuit and the regenerating connections are made with the fields under minimum excitation. The driver then cuts out his main resistance and brings up his excitation until the train is held at a steady speed on the down grade.

While regenerating the driver is able to make a partial application of the train brakes, the locomotive brakes being cut out by the control circuit. If, however, his application is too great the power circuit is immediately tripped and the locomotive brakes apply themselves automatically.

To prevent the motors generating current at excessive voltage, they are protected by an over-voltage relay which trips the circuit before the voltage becomes excessive.

THE AMERICAN INSTITUTE of the City of New York plans to hold an Exposition of Inventions beginning on Monday, December 8, 1924, and continuing through the week, in the Engineering Societies Building, 29 West 39th street, New York City. Preparations are being made to have exhibits from the leading American industries showing developments of various machines, utilities and processing methods. The American Institute is 96 years old and has held many exhibitions. Great annual fairs were begun in 1828 and have been held at Niblo's Garden, Castle Garden, Crystal Palace, Palace Garden, the Academy of Music, Madison Square Garden and other places. Arrangements for display can be made through a committee of the Inventors' Section, 47 West 34th street, New York city.

The Extension of Locomotive Runs*

Improvements Which Have Facilitated Longer Continuous Service—Advantages and Limitations

By Frank E. Russell
Mechanical Engineer, Southern Pacific

WE HAVE READ and heard more about long locomotive runs during very recent times than in past years, and as our ideas and thoughts are governed largely by comparisons, what would have been considered a long run two generations ago would be termed a very short run these days.

Shortly after the first steam locomotive was actually put in operation some of the enthusiasts, in discussing and writing about the possibilities of the new machine, became so visionary as to predict that at some day in the future the machine might be so perfected as to travel at the unprecedented speed of a mile a minute. On the other hand, there were many wise men of that day and age who contended it would be impossible for a human being to live traveling at that rate of speed, and furthermore, claimed that it would be impossible to build a machine which could run faster than 12 to 15 miles per hour and hold up under that service.

In order to appreciate the thought of the people at that time it must be remembered that their most rapid means of transportation was by saddle horse. We have since advanced from the small crude locomotives first designed for railroad transportation, to the huge modern locomotives of the present day. Paralleling this with other means of transportation, we have advanced from the one-horse shay to the luxurious automobile and aeroplane.

The development of the steam locomotive has kept pace with the development of civilization, for during a period of about 100 years the steam locomotive has developed from a crude miniature machine, capable of little more than self-propulsion and running not over 15 miles, to a huge, efficient machine capable of handling smoothly and easily luxurious passenger trains consisting of 12 cars weighing 875 tons over mountain, desert and plain at high speed for a distance of 815 miles. The existence of the locomotive corresponds to three generations and its development follows very closely the development of railroading which can also be divided into three characteristic periods, the period of railroad construction, the period of expansion and rule-of-thumb methods and the period of improvement in materials used and application of mathematical talent in computing stresses and proportioning parts.

The locomotives placed in service up to the year 1864 were of crude construction and wrought iron was the principal material used. They were not equipped with power brakes or any of the modern devices.

During the next period, 1864 to 1894, the principal changes in locomotives in this country were generally an increase in size, application of air brakes, automatic couplers, injectors and other appliances and the use of steel in construction.

During the period 1894 up to the present time we find new materials used and much improvement in design, also many new devices developed, not only increasing the power output and durability, but also producing more economy and a higher efficiency. The most important of these devices are superheaters, feedwater heaters, brick arches, boosters, improved valve gears, and improvements in air brakes and lubricators, all of which have a marked effect upon the distance over which the locomotive can be successfully operated.

*Abstract of a paper presented before the Pacific Railway Club.

Conditions Determining Length of Runs

There are many conditions which determine how far a locomotive can be economically operated. The first and most important of these is the topography of the country which determines the gradient and curvature, making it necessary to change power to suit the grade conditions.

The location of shop facilities is to a great extent controlled by the character of the country and operating conditions. In most cases these facilities were established many years ago when roads were built to suit the power and equipment then in use and there is no question but that a great many locomotive runs could be extended more or less if we could easily move the shop facilities to take care of the power. This, however, would mean an expenditure of huge sums of money which could be used to better advantage for other purposes.

Under present day conditions, when terminals and repair facilities have already been located, it requires considerable courage on the part of the motive power and operating officers to extend locomotive runs, especially as they cannot readily increase the runs, say 10, 20 or 30 per cent, but must take a bold step and double or treble the distance. Thus in referring to long locomotive runs, they are generally considered to be such only when locomotives are regularly operated over two or more districts where the power formerly was changed. The mere fact that locomotives may be successfully operated over an unusually long distance may not necessarily mean the most economical operation. The most important object in extending the length of locomotive runs is to increase their productive time, or in other words, obtain greater monthly mileage from the power.

The time locomotives are at terminals, in engine houses, etc., is non-productive time. Taking the Class I railroads in the United States during 1921, the average non-productive time of freight locomotives amounted to somewhat more than 17 hours out of the 24; hence, the locomotives were idle and not earning two-thirds of the time. In fact, during this time they are not only non-productive, but are actually costing the railroads considerable sums of money for attention and fuel in keeping them hot and otherwise taking care of them at terminals.

The average monthly mileage of freight locomotives in active service on all classes of railroads during the year 1921 was only about 2,400 miles, and for passenger locomotives, only 4,100 miles. Hence it will be seen that there is ample opportunity for improvement by obtaining greater mileage out of locomotives, which is equivalent to increasing the number of locomotives in service.

Many railroads are cognizant to these advantages, as is revealed by the number of railroads increasing the length of locomotive runs. In Table I several of the more striking examples of long runs in freight and passenger service have been listed and show the remarkable progress that has been made in this phase of operation.

Modern appliances such as the superheater, feedwater

heater, brick arch and the booster have contributed to the possibility of running locomotives over greater distances than have heretofore been considered feasible. The effect of the superheater is virtually to increase the boiler capacity. A locomotive equipped with superheater can perform approximately the same work and the boiler only evaporate two-thirds as much water as a saturated steam locomotive. This in turn is equivalent to increasing tank capacity and reduces the amount of scale-forming matter deposited in the boilers over a given run. It also produces increased power at high speed and permits of operating the locomotive at a shorter cut-off. In addition to this, the superheater very largely overcomes carrying water over into the cylinders, which washes off lubricants, and causes lubrication trouble.

The feedwater heater helps to make long continuous runs successful by diverting a portion of the exhaust steam which would otherwise be wasted, to the boiler in the form of water. This amounts to about 10 per cent, thus making it possible to go somewhat further before taking water and reducing the amount of impurities admitted to the boiler. In addition, as the heat is returned to the boiler there is a saving in fuel, as well as an increase in boiler capacity. In diverting a portion of the exhaust steam to heat feedwater, a reduction is made in back pressure in the cylinders, which in turn increases the power output of the locomotive by probably 2.5 per cent to 5 per cent. A modern locomotive equipped with a superheater and feedwater heater should be able to handle the same train for possibly a 50 per cent greater distance without evaporating any additional water in the boiler. However, such devices, when locomotives are idle, standing at terminals, on sidings, etc., are not making these savings; hence, the importance of keeping them in use.

Brick arches and other improvements in fireboxes and boilers have also done much to increase boiler capacity, fuel economy and reliability.

The booster in many cases will provide the locomotive with sufficient additional power to carry it over some controlling grade on the line, thus fitting it to the service and permitting its operation over a longer run than would otherwise be possible without the use of helpers. The use of boosters in starting heavy trains on grades or slippery rail will usually prevent drivers slipping and spinning, which sets up severe strains in machinery and undoubtedly produces more wear than many miles of actual running.

TABLE I—SOME OF THE LONG LOCOMOTIVE RUNS MADE ON AMERICAN RAILROADS

Passenger Service				Freight Service			
Road	From	To	Miles	Road	From	To	Miles
Southern Pacific	Los Angeles, Cal.	El Paso, Tex.	815	Southern Pacific	Sparks, Nev.	Carlin, Nev.	387
M. K. T.	Parsons, Kan.	San Antonio, Tex.	678	Southern Pacific	Del Rio, Tex.	El Paso, Tex.	453
Union Pacific	Kansas City, Kan.	Denver, Colo.	640	A. T. & S. F.	Los Angeles, Cal.	Needles, Cal.	310
Southern Pacific	Sparks, Nev.	Ogden, Utah	536	Union Pacific	Ellis, Kan.	Denver, Colo.	337
A. T. & S. F.	Winslow, Ariz.	Los Angeles, Cal.	602	Canadian Pacific	Calgary, Alberta	Edmonton, Alta.	180
Union Pacific	Council Bluffs, Ia.	Cheyenne, Wyo.	509	St. L. S. F.	Memphis, Tenn.	Birmingham, Ala.	251
Union Pacific	Council Bluffs, Ia.	Denver, Colo.	562	M. K. T.	Parsons, Kan.	Denison, Tex.	278
Union Pacific	Denver, Colo.	Ogden, Utah	577	Union Pacific	Kansas City, Kan.	Ellis, Kan.	303
Canadian National	Montreal, Que.	Toronto, Ont.	334	Grand Trunk	Ft. Erie, Ont.	Sarnia, Ont.	189
C. M. & St. P.	Milwaukee, Wis.	Minneapolis, Minn.	321	C. M. & St. P.	Chicago	Nahant, Ia.	209
Great Northern	St. Paul, Minn.	Minot, N. D.	526	Great Northern	Havre, Mont.	Wolf Point, Mont.	202
Great Northern	St. Paul, Minn.	Winnipeg, Man.	458	I. & G. N.	San Antonio, Tex.	Palestine, Tex.	260
Missouri Pacific	Hoisington, Kan.	Pueblo, Colo.	338	B. & O.	Cumberland, Md.	Parkersburg, W. Va.	205
St. L. & S. F.	Oklahoma City, Okla.	St. Louis, Mo.	542	B. & O.	Connellsville, Pa.	Willard, Ohio	264
Kansas City Southern	Pittsburgh, Kan.	Shreveport, La.	430	B. & O.	Willard, Ohio	Chicago	278

Better Materials and Design Have Reduced Wear and Tear

Refinement in design and materials of construction has made it possible to build locomotives with ample boiler capacity, sufficient strength of parts and adequate bearing areas, and still keep within the weight limitations. Much has also been accomplished in recent years by improving engine trucks, trailings trucks and spring and equalizing systems, relieving the locomotive of unnecessary shocks and vibrations. Vibration is probably the greatest single cause of failure and regularly exacts its toll of every piece of machinery in operation. One of the most important improvements in recent years that materially reduces shocks and vibrations has been accomplished by utilizing higher grade materials in conjunction with improved design in such parts as connecting rods, crossheads, piston rods, and pistons. The side rods and a portion of the main rod are revolving parts, and the others, such as the front end of the main rod, crossheads, pistons and piston rods, are reciprocating parts. The reduction in weight of both revolving and reciprocating parts materially reduces the wear on rod brasses and pins. The reduction in weight of reciprocating parts is one of prime importance for we know there is no other single feature that will cause more vibration and set up more destructive strains than counter-balance, either the lack of it or too much of it. The revolving parts we can balance in all directions as both the parts to be balanced and the counterbalance have a rotary motion. With reciprocating parts it is different; they have a horizontal motion and the balance placed in wheel centers to balance them has a rotary motion; hence all weight placed in wheel centers to balance these parts is over balance in a vertical direction and produces a disturbing force on the rail. With heavy reciprocating parts in common use 20 years ago, it was necessary to balance two-thirds of the weight of these parts. Reducing the weight of reciprocating parts to less than 1/160 of the weight of locomotive permits balancing only 50 per cent.

Advantages and Economies of Long Runs

The advantages and economy of running locomotives over two or more divisions when topography of country and operating conditions permit, are as follows:

First—Increased mileage. I have yet to learn of a single case where extending locomotive runs has not resulted in increased mileage over a period of time. However, increasing the length of run 100 per cent does not necessarily mean an increase in locomotive mileage of 100 per cent but it does usually range from about 30 per cent to approximately 100 per cent, depending on operating conditions, or, in other words, how the runs fit in with train schedules.

Second—Reduction in the number of locomotives required. An increase in locomotive mileage is equivalent to a corresponding increase of locomotives and as shown by the extension of runs by the Southern Pacific between Sparks and Ogden, the same 15 locomotives made 68 per cent more mileage per month after they were run through, which enabled them to do the same work as 25 locomotives operating over the old runs.

Third—Increased railroad capacity. The railroads of the country today are handling heavier traffic than at any time in their history. They are being hampered on all sides by legislative committees, which makes it very difficult to finance new facilities and equipment; hence the importance of getting the most out of what we have.

Reduction in work for locomotives at small outlying

terminals permits reducing the number of expensive tools required at such points, where they are used only a portion of the time, and permits assembling them at main terminals where they can be utilized to greater advantage, thus reducing the investment in these facilities.

Fourth—Economy at terminals. Locomotives running over two or more divisions do not require at the intermediate points the attention of wipers, hostlers, ash-pit and coal-dock men, machinists, boiler inspectors, etc. The cost of turning a locomotive after it has made two or more divisions is very little, if any, more than if similar attention had been given at intermediate points, and repairs can be made in a more substantial and workmanlike manner, as there is ample time and facilities to take care of them.

Fifth—Saving in fuel. During the year 1921 about one-fifth of all locomotive coal used, or 25,000,000 tons, was consumed when the locomotive was not doing useful work.

Waste of fuel on account of dumping coal fires, and rebuilding fires as well as fuel for keeping locomotives hot is saved, which amounts to a considerable sum. An eastern road reports cost of dispatchment about $12.00 and that at a particular point, on account of running through, the dispatchments were reduced by 28 per day, thus making a saving of $336 per day or approximately $10,000 per month from this cause alone. The amount of fuel required to keep locomotives hot and prevent freezing at outlying points, in cold climates, is a big item. The amount of coal lost in dumping and rebuilding fires is estimated at from one to two tons per locomotive dispatched, and with coal at from $3.50 to $5.00 per ton, this represents an item of importance in the reduction of expenses.

On lines using oil this saving is not experienced, but they do enjoy the saving on account of not having to keep engines hot at intermediate points. At one point alone, in cold climate, this has been estimated at $15,000 per annum.

Do Long Runs Increase Maintenance Cost?

Now, let us consider the possible disadvantages, increased cost of maintenance and increase in engine failures. Maintenance is a factor to be considered in connection with long locomotive runs, since an increase in the daily mileage of motive power and a reduction in the time held at roundhouses would presumably affect the condition of locomotives. For this reason particular inquiry has been made in regard to the average mileage between shoppings of locomotives operated on long runs and it appears where records are available the mileage made by these locomotives between shoppings is as high, if not higher, than when operated over short runs.

It would appear reasonable that we should get as much if not more mileage out of a locomotive if run off in, say, two years time than in three or four, as we know time and the elements collect their toll whether a locomotive is in operation or not. Also, it is a question if the cooling down and firing up strains in a locomotive do not do more damage than fair service.

In the case cited of the long run on the Southern Pacific between Sparks, Nevada, and Ogden, Utah, since the locomotives went into service they ran off 47,691 miles in ordinary service at the rate of 5,299 miles per month, and up to December 31, 1923, had run off 213,380 miles in long runs, averaging 8,891 miles per month. This makes an average total mileage of 261,000 miles up to January 1, 1924, and will probably average about 300,000 miles before locomotives go into shops for general repairs, which is certainly not discouraging for long runs.

The question of possible increase in locomotive failures has been watched by those interested in long runs and it appears that such failures apparently are not affected by the mileage which the locomotive makes during its individual run. Analysis of failures shows that the majority take place on the first division and that the mileage of the individual runs has little or no effect upon the number of failures experienced.

Special attention and care are necessary in making long runs successful. Much depends on the care exercised on the part of engine crew, inspectors and shop forces. A locomotive offered for service must be in good condition, which means that all details requiring attention have received that attention and where repairs are made, that they be of a permanent and not of a temporary nature. This latter practice frequently occurs on ordinary runs, in order to get locomotives back to the main terminal. Then, oftentimes, on arrival at main terminal the men are especially busy, or think they are, and "Let her go for another trip."

Enginemen should report on blanks provided for that purpose all parts that are not working properly or that in their judgment require attention. This is especially necessary where crews are changed, so the proper attention can be given on arrival at the terminal.

Lubrication is especially important and the engineman should give particular attention to this; also, shop forces should see that all parts will lubricate properly.

On coal burning roads it is important that the fireman keep his fire in proper condition up to the time he is relieved, so that the fireman taking the locomotive will not be put to undue difficulty.

By building up long runs gradually and supervising closely, these items of lubrication, work reports and fire conditions may be eliminated and no more trouble experienced with them than on shorter runs.

More Miles Per Locomotive the Ultimate End

After all is said and done, the consideration of prime importance is, not so much the attainment of the longest possible locomotive runs, as it is to obtain the greatest mileage per unit of time per locomotive owned, with the smallest fuel consumption, and the least expenditure for repairs and enginehouse attention. This can best be done by designing equipment to fit the special service requirements, providing boilers of ample capacity, and applying standard devices that will increase the efficiency and reduce fuel consumption. Particular attention should be given to the design of various details, using high quality material in parts where reduction of weight will minimize the stresses set up in machinery and in track and roadbed. Select the softest natural feed waters available, and chemically treat those that contain objectionable impurities, reducing these impurities to a minimum, and provide hot water boiler washing facilities at terminals to reduce cooling down strains in the boiler and save fuel.

L. & N. to Build Another Bridge on Gulf Coast

A BRIDGE OF SIMILAR DESIGN and involving the same construction methods as those used in the Rigolets bridge will be constructed by the Louisville & Nashville in the replacement of its bridge over Chef Menteur pass, which connects Lake Borgne with Lake Pontchartrain, at a point about 19 miles east of New Orleans, La., or 12 miles west of Rigolets pass. Like Rigolets, Chef Menteur is a tidal pass, so that the two bridges are subject to the same tidal wave and severe wind conditions that occur from time to time along the Gulf coast.

The new Chef Menteur bridge will consist of three spans —a draw span 285 ft. 6 in. in length between centers of supporting piers, with a flanking span on each end 273 ft. long from center to center of piers. The five piers will stand

in water having a maximum depth of 50 ft. These piers will be cylindrical in form, similar to those of the Rigolets bridge which was described in the *Railway Age* of March 22, 1924, page 777. The bridge with its approaches will cost $1,514,000.

The preliminary borings indicate that all five of the Chef Menteur piers will be landed in sand and that the depths to which they will be sunk will be somewhat greater than the depths to which the piers of the Rigolets bridge were sunk, but the same method of construction and sinking will be used.

Design of Piers and Location of Bridge

The piers are designed with a view to sinking them by the open dredging method while in process of construction. They are provided with a concentric well 16 ft. in diameter. The portion of the shaft that will be below the bed of the pass will have an outside diameter of 34 ft. and the upper portion an outside diameter of 28 ft. The lining of the well and the outside of the lower portion will be formed by steel plate shells joined at the bottom to form a cutting edge, the annular space being filled with concrete. The upper portion will be concreted with the use of movable steel forms for the outside, this work being conducted in such relation to the sinking of the pier that the concrete being placed will be above water at all times.

The new bridge will be located south of and approximately parallel to the existing bridge carrying the railroad across Chef Menteur. The distance between center lines of the new and old bridges will be 50.3 ft. at the Mobile end of the new bridge and it will be 62½ ft. at the New Orleans end.

The contract for constructing the piers has been awarded to the Missouri Valley Bridge & Iron Company of Leavenworth, Kan., on a modified cost plus fee basis. The same contractor recently completed the piers for the Rigolets bridge and will transfer the machinery and plant from Rigolets to Chef Menteur. The actual construction of the piers has not yet commenced but the contractor is accumulating material, building camps and doing other preliminary work.

Superstructure and Approaches

The superstructure of this bridge will consist of through riveted trusses, the elevation of base of rail to be 18 ft. above mean sea level. In addition to the three bridge spans above mentioned, there will be 144 ft. of creosoted open deck pile trestle with six piles to the bent at each end of the bridge proper in addition to 8,500 lin. ft. of embankment approaches.

These approaches will be built over salt marshes, and as the material in these marshes will support only a limited load it is necessary to place the fill from pile trestles which are to be constructed of adequate strength to carry trains for some years after the completion of the bridge as the embankments will subside into the marsh for a long time after it is deposited. The filling material will be excavated from beneath the water at a point about 25 miles from the bridge and will consist of heavy sticky clay.

The experience with similar construction at the ends of the Rigolets bridge indicates that more material will go below the marsh level in these approaches than will be required in the neat section of the embankment. This condition makes construction of the approaches very costly. The excavation of the material for fills is being done by the Nichols Contracting Company with a drag line machine. The hauling and placing of this material, as well as the construction of the trestle approaches, is being done with railroad forces.

The design and construction of the bridge is under the direction of W. H. Courtenay, chief engineer of the Louisville & Nashville, Louisville, Ky.

Santa Fe Reduces Tie Renewals to 128 Per Mile of Track

THE ATCHISON, TOPEKA & SANTA FE has long been recognized as a pioneer in the consistent preservation of its ties, having followed this practice continuously since 1885. It is natural, therefore, to look to this road for an indication of the results which a railway may expect to secure by adhering to this practice consistently. For this reason the following figures showing the number of ties inserted for renewals in all tracks on the system is of particular interest as indicating the progressive decline in the number required for this purpose.

Year	Total miles of track	Total ties inserted for renewal	Total ties inserted per mile of track	Average number of ties inserted for renewals annually for five year period	Average number of ties inserted per year per mile of track for five year period
1898	8,185	2,751,849	336	.....	...
1899	9,028	2,246,250	249	.....	...
1900	8,804	1,687,537	192	.....	...
1901	9,368	1,557,880	166	.....	...
1902	9,557	1,954,823	204	2,039,668	229
1903	9,768	2,352,502	241	1,959,798	210
1904	10,237	2,770,306	271	2,064,610	215
1905	10,885	2,788,378	256	2,284,778	228
1906	11,637	2,291,997	197	2,429,601	234
1907	11,694	3,364,921	288	2,713,621	251
1908	12,169	3,666,798	301	2,976,480	263
1909	12,601	3,690,633	293	3,160,545	267
1910	13,379	3,758,984	281	3,354,667	272
1911	13,889	3,738,854	269	3,644,038	286
1912	14,488	3,192,585	220	3,609,571	273
1913	14,766	2,850,823	193	3,446,376	251
1914	15,293	2,728,629	178	3,253,975	228
1915	15,409	3,191,823	207	3,140,543	213
1916	15,517	3,118,941	201	3,016,560	200
1917	15,661	2,483,651	158	2,874,773	187
1918	15,931	2,456,203	154	2,795,849	180
1919	16,087	2,302,952	143	2,710,714	173
1920	16,899	2,753,673	163	2,623,084	164
1921	16,912	2,514,325	149	2,502,161	153
1922	17,005	2,693,905	158	2,544,212	153
1923	17,346	2,229,201	128	2,498,813	148

Inspection of Ties

In addition to observing the results on the system as a whole, this road has installed a large number of test sections from year to year in which various kinds of ties and of treatments are being watched. A further indication of the possibilities of treatment is afforded by the results of the recent inspection of one of these test sections of creosoted ties which were installed in the Emporia, Kan., cutoff in 1906, the record of which is as follows:

		Taken Out			
		Rotten	Mechanical wear	Other causes	Total
1915	..	...	7	7	
1917	..	16	8	24	
1918	..	...	8	8	
1920	3	...	315	318	
1921	..	...	49	49	
1922	..	427	...	427	
1923	..	784	...	784	
Total taken out					1,617
Total remaining in track					22,621
Average life in track to 1923					16.93
Per cent of ties removed from track					6.67

Original number inserted: 24,238

From the above it is noted that these ties had given an average life of 16.93 years at the time of their last inspection on December 31, 1923, at which time only 6.67 per cent had been removed from the track. From present indications these ties will give an average life of more than 20 years, while if they had been bored and adzed before treatment and had been provided with standard tie plates at the time of their insertion, this life would have been extended still further. As it was these ties were installed before the development of the boring and adzing machine and were provided originally with six-inch tie plates which were later replaced with the present Santa Fe standard tie plate, incident to the replacement of which considerable adzing was done by hand.

Rear Collision on the Burlington at Buda, Illinois

Mail Train Hits Passenger Train Because of Failure To Control Speed in Accordance with Signal Indication

EIGHT PERSONS were killed and 11 injured on the Chicago, Burlington & Quincy at Buda, Ill., at 4:40 a. m., on June 30, when train No. 8, a mail train from the west, collided with the rear end of train No. 2, a limited passenger train from Colorado. Train No. 2, which was 40 minutes late, had stopped at Buda for coal when the mail train rounded a curve a short distance west of the coaling station and collided with the standing passenger train. Buda is on the main line of the Aurora division between Galesburg and Aurora, which is double track and has automatic block signals.

Equipment and Operation of Trains

Eastbound passenger train No. 2, made up of one baggage car, two coaches, one chair car and ten sleeping cars in the order named and hauled by engine 2849, passed Neponset, the first station west of Buda, at 4:26 a.m. It passed Buda station at 4:34 a.m. and stopped at the coal chute 5,000 ft. east of the station about 4:37 a.m.

The mail train, No. 8, consisting of eight mail cars hauled by engine 2852 passed Neponset at 4:30 a.m., passed Buda station at 4:38 a.m. and while traveling at a speed of approximately 20 miles an hour struck the rear of train No. 2 between 4:39 and 4:40.

All of the Burlington-owned cars on train No. 2 were of steel construction. The rear car, an observation car, and also the Pullman car next ahead had steel underframes, but the third car from the rear was of wooden construction. The locomotive of train No. 8 penetrated the observation car about one third of its length and pushed its rear trucks forward. The next two cars "jackknifed" on the curve, Pullman car Caliente being forced into the car ahead, the Mackinaw, and stripping off the left side of the car for three fourths of its length. It was in this car, the Mackinaw, that all but one of the fatalities occurred. Six passengers, one Pullman employee and one railroad employee (the fireman of train No. 8) were killed. Eleven passengers, one railroad employee and one postal employee were injured.

Circumstances Contributing to the Accident

Buda is not a regular coaling stop for train No. 2, but on account of heavy rains the train had been delayed. The unusual number of stops made it expedient to take coal at Buda. Engineman Huber of No. 8, observed the caution indication of signal No. 6217, which is 5,346 ft. west of signal 6167, and slackened speed so as to stop at signal 6167, which was in the stop position, as shown in the drawing. When nearing this signal his train was traveling at a speed between five and ten miles an hour. The rule governing the stop indication of signal 6167, an automatic Stop-and-Proceed signal, is as follows:

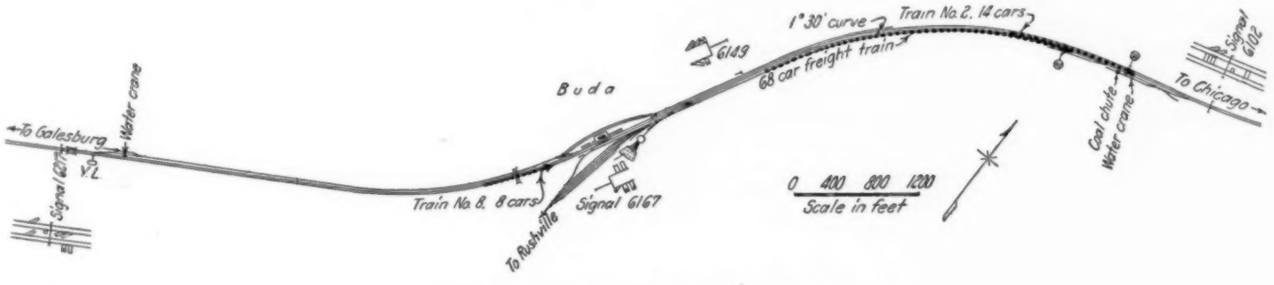
"When a train is stopped by a Stop and Proceed signal it may proceed—

(B) On two or more tracks, at once at slow speed, expecting to find a train in the block, broken rail, obstruction or switch not properly set."

Thus the signals permitted the train, after a stop, to proceed to the next automatic block signal under caution. The definition of caution in the time table states that the engineman shall be able to stop his train within range of his vision.

The cross-over and siding switches at Buda station are hand thrown, and in order to permit a train to proceed past automatic signal 6167 at slow speed without a stop (as when a movement is to be made to a siding or through the cross-over) a calling-on arm has been provided, on the same mast and beneath the automatic signal. This signal is operated electrically but controlled by the station operator.

When nearing this signal the engineman of No. 8 had reduced his speed to about five or ten miles an hour, when the operator cleared the calling-on arm, with the evident intention of preventing the mail train from being required to make a stop at the signal. The rule governing this calling-on arm is to the effect that "a clear signal of a calling-on arm is an indication to proceed to the cross-over or siding and be governed by instructions of the operator."



Track and Signaling Layout at Buda

On being given this proceed indication of the calling-on arm the engineman of train No. 8 proceeded past the signal without stopping and pulled slowly by the station; at which time the operator came out on the platform and held up his hand showing two fingers, indicating that train No. 2, was in the block. This was acknowledged by the fireman, who was seated in the left side of the cab. The acceptance of this information evidently completed the function of the calling-on arm and the engineman, in proceeding further, should have been governed entirely by the stop indication of the automatic signal 6167, which he had passed in the stop position; therefore, according to the rule, he should have proceeded at low speed prepared to find a train in the block. East of the station local circumstances interfered with the engineman's view of the track ahead. As indicated in the sketch, beginning at a point about 2,000 ft. from the station there is a 1 deg. 30 min. curve to the right, and a long freight train lying on the siding at the right of the main track cut off the view of train No. 2.

After passing the station the speed of train No. 8 was

increased to 15 or 20 miles an hour, as estimated. On account of the view being cut off by the standing freight train, the engineman raised himself nearly to the level of the cab roof in the window in an effort to look across and over the freight train to see the indication of signal No. 6102, which is about 800 ft. east of the coaling station. Signal 6102 indicated proceed, train No. 2, not having reached it; and there was no other train in the block beyond. Engineman Huber says, however, that he could not see this signal from where he made an effort to do so.

However, while he was up on the lookout for the indication of signal No. 6102, he overlooked and passed the flagman of train No. 2, who was at that time about 480 ft. from the rear of his train and had placed a lighted fusee. But he had not placed torpedoes and there is some question whether he had left the rear of No. 2 immediately when the stop was made; also whether, considering the unusual stop, curvature of track, and the presence of the freight train, he had gone back as far as was reasonably possible before the arrival of No. 8. Sunrise on this date was at 5:18 a. m., and the collision occurred at 4:40 a. m., just about daylight, the weather being clear.

As Engineman Huber of train No. 8 was returning to his seat after looking out for signal 6102 he saw the rear of train No. 2; but the collision occurred immediately after, and while the mail train was traveling at a speed estimated as about 15 to 20 miles an hour. The damage resulting from the impact indicates a speed in excess of this estimate.

Freight Car Loading

WASHINGTON, D. C.

FREIGHT CAR LOADING during the week of June 28 showed a slight increase as compared with the previous week but was below that for the first week of June and 113,116 cars less than the total for the corresponding week of last year. The total was 908,355 cars, as compared with 1,021,471 cars last year. Loading in the Pocahontas and Southwestern districts was above that for the corresponding week of last year, as was the loading of grain and grain products, 38,408 cars, but all other classes of commodities showed reductions. The largest reductions as compared with last year were in coal loading, which fell off 40,565 cars, and miscellaneous freight, which was 25,295 cars less than for the corresponding week of last year. Grain and grain products, livestock, coke, ore and merchandise also showed reductions as compared with 1922.

For the 26 weeks of 1924 the aggregate loading was 23,186,707 cars, as compared with 24,005,502 cars in 1923 and 20,020,267 cars in 1922. The summary of the report compiled by the Car Service Division of the American Railway Association follows:

REVENUE FREIGHT CAR LOADING

Week Ended June 28, 1924

Districts	1924	1923	1922
Eastern	216,759	249,829	196,800
Allegheny	187,975	225,474	169,883
Pocahontas	41,676	40,549	43,993
Southern	123,630	132,033	124,487
Northwestern	140,968	171,536	151,553
Central Western	136,166	142,715	121,794
Southwestern	61,181	59,335	54,335
Total Western	338,315	373,586	327,682
Commodities			
Grain and grain products	38,408	37,117	41,561
Livestock	27,846	30,198	28,332
Coal	144,759	185,324	94,269
Coke	6,968	14,745	10,365
Forest products	67,540	79,297	61,718
Ore	59,198	80,791	65,055
Mdse., l. c. l.	240,040	245,108	246,625
Miscellaneous	323,596	348,891	314,920
Total	908,355	1,021,471	862,845
June 21	903,700	1,004,982	866,321
June 14	902,710	1,008,838	848,657
June 7	910,707	1,012,312	836,208
May 31	819,904	932,684	739,559
Cumulative total, January 1 to date	23,186,707	24,005,502	20,020,267

The freight car surplus for the week of June 15-22 averaged 359,644 cars, a slight decrease as compared with the week before. This included 153,311 box cars and 167,315 coal cars. The surplus on the Canadian roads was 21,275 cars, including 18,450 box cars and 150 coal cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended June 21 increased 1,414 cars of which 653 cars were in the Eastern division and 761 in the Western division. In the Eastern division merchandise loading was increased by 443 cars and coal by 300 cars. In the Western division grain loading was increased by 544 cars, other forest products by 206 cars and miscellaneous freight by 264 cars. Compared with the corresponding week last year car loading was heavier by 3,669 cars or 6.6 per cent.

Cars of revenue freight for the three weeks, by commodities, follows:

Commodity	For the week ended 1924 June 7 cars	June 14 cars	June 21 cars
Grain and grain products	10,607	9,149	9,433
Live stock	2,131	2,021	2,114
Coal	4,973	4,945	5,128
Coke	176	251	166
Lumber	3,964	3,993	3,904
Pulpwood	2,195	2,445	2,515
Pulp and paper	1,917	1,982	1,908
Other forest products	2,656	2,364	2,700
Ore	1,946	1,599	1,811
Merchandise l. c. l.	15,528	15,781	16,139
Miscellaneous	12,753	13,355	13,481
Total cars loaded	58,826	57,885	59,299
Total cars received from connections	28,256	29,533	31,104
Total cars loaded for corresponding week, 1923	53,527	56,640	55,630
Cumulative loading to date—1924			1,343,731
Cumulative loading to date—1923			1,232,825

Revenue car loadings at stations in Canada during the week ended June 28 showed a decline from the previous week of 1,794 cars. Grain loading showed an increase in both divisions but pulpwood, pulp and paper and other forest products all registered decreases. Ore shipments in the Eastern division fell off 434 cars and merchandise and miscellaneous freight also showed decreases in the East. Compared with the corresponding week last year car loadings were greater by 3,065 cars, loadings last year showing a decline from the previous week somewhat similar to the 1924 record.

TOTAL FOR CANADA

Commodity	For the week ended 1924 June 14 cars	June 21 cars	June 28 cars
Grain and grain products	9,149	9,433	9,626
Live stock	2,021	2,114	2,060
Coal	4,945	5,128	4,978
Coke	251	166	203
Lumber	3,933	3,904	4,104
Pulpwood	2,445	2,515	2,333
Pulp and paper	1,982	1,908	1,521
Other forest products	2,364	2,700	2,593
Ore	1,599	1,811	1,408
Merchandise l. c. l.	15,781	16,139	15,834
Miscellaneous	13,355	13,481	12,845
Total cars loaded	57,885	59,299	57,505
Total cars received from connections	29,533	31,104	30,764
Total cars loaded for corresponding week, 1923	56,640	55,630	54,440
Cumulative loading to date—1924			1,401,236
Cumulative loading to date—1923			1,287,265

SHARES OF STOCK of the Pennsylvania Railroad now owned by employees number more than 50,000; members of the Mutual Beneficial Association having taken 22,402 shares, and a larger number, 28,283, having been taken by employees through the Employees' Provident and Loan Association. The par value of shares is $50 each; and, by arrangement through these associations, employees make payment in monthly installments. These shares are owned by about 10,000 employees or an average of five shares to each person; and, in addition, it is known that many employees own Pennsylvania stock which they acquired several years ago, before the beginning of the present movement.

How the Quality of Rails Can Be Improved

A Number of Suggestions for Changes in Specifications to Secure a Better Grade of Steel

By Charles W. Gennet, Jr.
Manager of Rail Department, Robert W. Hunt Co., Chicago

THE NUMBER OF FAILURES occurring in 90-lb. rails in 12 months on two leading western lines was as follows:

	Road X	Road Y
Track miles of rail in service	7,621	3,547
Number of failures in "A" rails	1,034	914
Number of failures in "B" rails	378	346
Total number of failures	2,769	2,030
Per cent of all failures that were "A" rails	37.3	45.2
Per cent of failures that were "B" rails	13.6	17.0

In short, 50 per cent of all of the troubles with rails on one road can be charged to the "A" and "B" rails; while in the other case the elimination of the "A" rails, amounting perhaps to 15 per cent of the total, would have cut its rail troubles nearly in two. The cost of replacing these defective rails is a considerable item while the hazard of such rails is of the utmost importance.

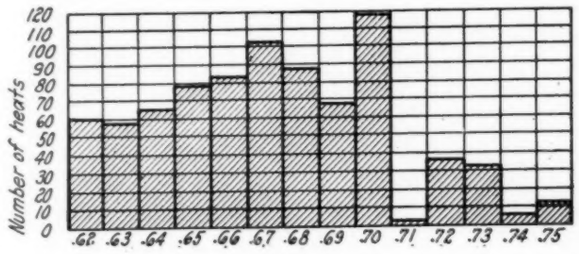


Fig. 1—Number of Heats with Each Per Cent of Carbon, Rolled at One Mill

Plainly, railroad interest in the rail situation continues to center on the problem of improving the conditions for which rails rolled from the tops of ingots are responsible. The probable transition from 33-ft. to longer rails, which will effect a decrease of at least 15 per cent in the cost of joints, now appears to be a reality, at least in certain quarters; but in the anxiety to secure this advantage some other phases of rail specifications should not be over-looked, for they offer possibilities of large economic value. Consideration of some of the details of present specifications suggests that various changes in practice can be made that will go a long way toward insuring better results from rail and attention to them is therefore opportune.

A More Uniform Carbon Content Is Desirable

There is a direct relation between the chemical and physical requirements of most rail specifications. No manufacturer wants to make high carbon heats and roll them into rails, only to have the rails rejected at the drop test because of their failure to withstand the prescribed conditions of that particular test which, after all, is a test for brittleness. The tendency in many instances has been for the manufacturer to lean toward the low side of the carbon range and to thus make a large number of heats containing a relatively low amount of carbon with a few high ones to bring up the average to the desired amount. This tendency is illustrated by the Diagram I which shows a total of 810 heats of rail steel made at one mill to come within the limits of 0.62 to 0.75 per cent carbon, the average of all being 0.67 per cent carbon.

Obviously a large tonnage of rails has been delivered with its carbon content on the low side of the range and a comparatively small tonnage containing a high carbon content. A considerable portion of this rail is apt to show early wear and short life, and the railroad thus suffers from the manufacturers fear that his high carbon heats will not withstand the drop test. That it is practicable to produce more uniform results is shown by Diagram II wherein is chartered the number of heats with each carbon content in the same limits, rolled at another mill. To correct this tendency it has been suggested that specifications should contain a provision to the effect that there shall be as many heats with the carbon content on the high side of the mean of the range as there are with carbon below that mean. If however, the upper limits usually imposed for carbon and manganese are omitted entirely and only the low limits specified, the manufacturer has a certain latitude not now existing, and, provided the occasional high carbon and high manganese heats pass the drop test, such rails are no doubt amply safe and fit for use in special places of dense traffic. The omission of these top limits and the separate shipment of certain heats would mark a considerable advance from many points of view.

It has been the practice for many years to require that the chemical composition of a heat as large as one hundred tons, shall be determined from a small ladle test ingot. No particular control of the casting of the test ingot has been prescribed, with the result that it may be taken from the first part of the heat cast or from the last, or sometimes in between, and not infrequently according to the melter's whim and hope that his heat will be accepted. In many instances it has apparently failed properly to represent the rails later rolled from the heat, and, in fact, it has often been misleading in deciding whether a heat was really a "hard" one or a "soft" one. An improved practice which is being followed on rails rolled for several roads this year requires that two ladle test ingots be cast and analyzed, one being taken from the second ingot cast and the other from next to the last ingot cast, and while the average of the results accepts or rejects the heat, both analyses must be reported. The advantages of this provision are obvious for a double check on the heat is at once set up and what may be radical variations in the composition are determined definitely and early.

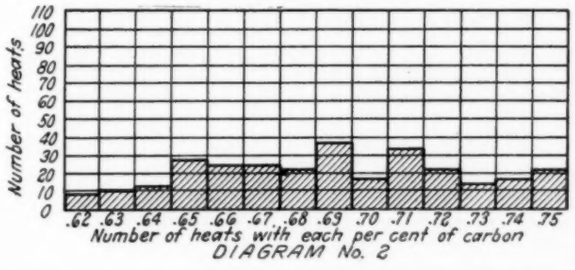


Fig. 2—Number of Heats of Rail with Each Per Cent of Carbon, Rolled at a Second Mill

The disposition of the "A" rails, or the metal from the top of the ingots, is a somewhat delicate problem, complicated

because different conditions exist at various mills while questions of cost also constitute an important factor. The situation is aggravated by the use in late years of some very large ignots which unquestionably pipe and segregate much deeper and more than those formerly cast. Today a 7,000-lb. ingot making six 90-lb. rails is the smallest commonly used in the United States, while the largest may weigh 14,000 lb. and make eleven or twelve 90-lb. rails. From a mill standpoint the latter have many advantages but for quality the six-rail ingot is doubtless much more dependable than the twelve-rail ingot. The time has likely come when special consideration will have to be given to the drafting of specifications for mills using big ingots for in such cases their "B" rails are possibly segregated as badly as the "A" rails from the other mills.

It is very evident that the A. R. E. A. specifications of 1915 do not go far enough in the protection of the purchaser against receiving defective top rails. This is chiefly because only 3 actual ingots from a heat are dealt with and there may be 20 others in the same heat of quite different character. The extra price charged for rails made under this specification frequently appears unwarranted for no change is ever made in mill practices when it is used and very often the amount of rail rejected under its provision is so small as to be negligible. Frequently railroads have so modified that specification as to avoid the extra charge by accepting as special rails those that they would have rejected because of the fracture showing an interior defect. This reduces the A. R. E. A. specification virtually to that of the American Society for Testing Materials and either specification may be termed a subterfuge for classifying the top rails into good ones and bad ones.

Unquestionably the best relief from the troubles that come in rails rolled from the top of the ingots is that obtained from specifying a 25 per cent top discard. This insures almost positive elimination of the suspicious metal. In most cases it assures the discarding of somewhat more than the metal ordinarily making the "A" rail, and it will often eliminate the "B" rail as well. Thus there is a benefit in that respect. The extra price charged for making this discard should be given careful consideration as it provides against all later trouble or anxiety over the customary use of the most suspicious rails.

Rolling "A" Rails Into Tie Plates

The practice of rolling the metal from the top of each ingot into hot-punched tie plates has not received the attention it merits. When this measure was proposed the cost of tie plates was considerably less than the cost of rails and the plan appeared attractive. A later adjustment of prices raised the price of tie plates above that of rails, and in addition, an extra price was placed on hot-punched plates. The result has been the almost total abandonment of this very attractive method of eliminating the "A" rail troubles. Last year approximately 2,200,000 tons of rails were rolled of 85-lb. section and heavier. Probably about 225,000 tons of these were "A" rails. About 360,000 tons of steel tie plates were rolled. It is obvious therefore, that all of the "A" rail metal could have been used in tie plates and considerable regular tie plate steel would have been required in addition. In the case of the large ingots used at some mills it could easily have been arranged for both the "A" and "B" rail metal to go into tie plates with a correspondingly greater improvement in the quality of the rails from the remainder of the ingots.

At present there are only three mills adequately adapted for delivering hot-punched tie plates. These mills roll nearly half of the tonnage of heavy section rails and two of them use large ingots weighing over 12,000 lb. in which piping and segregation are serious factors. Certainly the roads obtaining rails from these mills will find it desirable to consider carefully the possibilities offered by this plan.

The third arrangement for limiting the use of defective top ingot metal lies in making the nick and break test on the top of each "A" rail and classifying it on the basis of the appearance of the fracture. This is a much more positive system of testing than that provided in the A. R. E. A. specification, the difference being that in the latter the fractures of only three "A" rails of a heat are examined, while in the other every "A" rail is subjected to the test.

CURRENT METHODS FOR RESTRICTING ACCEPTANCE OF RAILS ROLLED FROM THE TOP OF INGOTS

No.	METHOD	REMARKS
1	25 per cent discard from all ingots.	Probably the best plan as it is the most positive way of eliminating all suspicious metal. Costs extra.
2	Rolling "A" (and perhaps "B") rail metal into hot-punched tie plates.	Utilizes what is suspicious metal for rails by putting it into tie plates. Practical, logical and economical, but unfortunately can only be done by a few mills and with an extra charge for the tie plates.
3	Nicking, breaking and examining the fracture of a piece from the top end of each "A" rail and classifying it accordingly.	This is a plan for testing each ingot. Examination of the fracture is not an exact means of detecting segregation but it goes a long way toward the end desired. Unacceptable to most mills but proven practical at others and without extra cost.
4	A. R. E. A. 1915 specification.	Somewhat similar to No. 3, but under it the fractures of only three "A" rails of a heat are examined. Hence it is not positive in any sense, but rails made under it cost extra.
5	A. R. E. A. 1915 specification modified to be like the A. S. T. M. specification A-1-14.	Same as No. 4, but modified so that rails that would be rejected on the basis of the fracture are accepted as special rails and the extra price thereby avoided. A popular but uncertain plan for classifying top rails.

Unfortunately, manufacturers as a whole have not considered this method of testing with favor. It is universally used in Canada and one Western mill will roll over 100,000 tons to this specification this year while one or two others have applied it to similar orders. The test has much to commend it from every point of view.

Elimination of the elongation or ductility tests required by most specifications deserve attention. Years of experience with this test have proved that it serves no good purpose. It is an effort to introduce laboratory refinements into a mill where conditions for dealing with a hundredth part of an inch, measured on the rough surface of the rail, are quite impracticable. At any rate the ductility specified is easily obtained and the rejections under the present arrangement are negligible. An obvious relation exists between deflection and elongation so that the specifying of certain limits for deflection could easily be worked out and the question of a ductile metal thereby well established.

Longer Rails Are Desirable

Perhaps no phase of the rail situation has given rise to more comment in recent months than the question of length of rail. As is well known, rails 39 ft. in length are being delivered from three mills as a standard practice on certain orders. The other mills not now adapted for finishing these long lengths will of necessity have to alter their plants so as to make it feasible to provide them without restricting production, and there seems to be no doubt but that this will be done in the near future. The saving in the cost of joints and their later upkeep renders the change to longer rails an economical procedure. It is to be hoped that the railroads will determine quickly what is the most desirable length and thus make it possible for a standard to be arrived at, from which there will be no departure for different lengths for different roads greatly handicap the mills and create almost as much confusion as different sections and different drilling dimensions do now. The fact that 39 ft. lengths are already being rolled in various cases should be given weight by other roads and if possible that length definitely settled on as the new standard.

"Milling" the ends of rails is an extra operation performed by special machines immediately before the rails are drilled. The hot sawing, chipping and filing of the rail ends is exactly the same today that it was 30 or 40 years ago when steel was much softer and the rail section much lighter than now.

The change to open-hearth high carbon steel with much larger sections to saw has unquestionably complicated the success of the old style operation, so that the saws cut less accurately and produce tough heavy burrs that are much harder to clean off properly. Milling insures the elimination of all burrs and an almost perfectly square end as well. Small burrs which it has been difficult to remove entirely by hand and which have possibly nicked the joints and caused their failure, and have also unquestionably been the source of "chipped heads," can be eliminated by milling. Incidentally, rails are made much more accurate to length, and better drilling is secured by milling.

For many years specifications have required that rails be rolled accurately to templet in respect particularly to the angle bar fit. This requirement is naturally impracticable of attainment. It has given rise to rails being accepted sometimes with their "fish fit," as it is called, a little loose and frequently tight. The limits or tolerances permitted have almost invariably been those arbitrarily set up by inspectors and more often than otherwise, been the cause of unnecessary argument and dispute in the mill. One road has lately specified that the "fish fit" should be correct to templet but that a 1/32 in. tight fit would be allowed. This tolerance, all on the side of tightness, means that the joint at times will be 1/32 in. farther out from the web of the rail. Experience with this innovation has proved its desirability and it is hoped that other specifications will be changed accordingly.

The foregoing subjects are among those most important from a rail specification standpoint. Good steel is the greatest fundamental for good rails. Various details of steel making and treatment are open to proof and, in fact, to some experiment.

Estimated Freight Revenue by Classes of Commodities

WASHINGTON, D. C.

THE INTERSTATE COMMERCE COMMISSION'S BUREAU OF STATISTICS has issued a table estimating the amount of the freight revenue of Class I railroads in 1923, subdivided among the various classes of commodities, as calculated on the basis of returns furnished by a limited number of railroads. It is not possible to give this same detail from official sworn returns for all Class I roads, because the statistical requirements have not been extended to the compilation of freight revenue by classes of commodities. But some roads kept such a record for their own purposes for the calendar year 1923. Based on information derived from returns made by such roads, an average revenue per ton handled for each of the 70 classes of commodities was derived for each district, and this average was then applied to the number of tons shown by the regular statistics covering all Class I carriers to get the estimated revenues by classes. The number of reports used in arriving at average revenues per ton was as follows:

	Eastern District	Southern District	Western District	Total
Number reporting revenue for all commodities.	8	10	28	46
Number reporting one or more commodities but not all	20	5	3	28
Total	28	15	31	74

The reports in the Eastern District are said to be hardly representative for commodities other than coal.

When the estimated revenues by classes were aggregated, the total in each district was found to be in excess of the corresponding actual freight revenue for the year 1923, as published in the monthly report for December, 1923. The explanation doubtless is that the roads included had a longer average haul than that for all roads. This was especially true in the East. It was decided, therefore, to scale down the estimated figures in each district on a percentage basis to make the total in those districts equal the known correct total as published, except that in the Eastern District, the bituminous and anthracite coal revenues per ton, and, in the Southern District, the bituminous coal revenue per ton, were not adjusted because of their more complete representation in the reports. With these exceptions, the percentages applied to the initially estimated result to get the figures here published were as follows:

Eastern	84.981006
Southern	97.224612
Western	92.194014

"The revenues shown in each class are to be taken as estimates," the bureau says in a statement accompanying the compilation, "but yet they doubtless give a sufficiently accurate approximation for the purposes for which the estimate is chiefly used; namely, that of indicating the effect of extensive rate changes. Without such an estimate, we are completely in the dark as to what the probable effect of extensive rate change would be if applied to important classes of commodities. It would be desirable, in order to have more exact information along this line, to institute regular annual reports showing the tons, ton-miles and revenue for each class of traffic. This would permit of the computation of the average haul per ton of each commodity class as well as of the revenue per ton and per ton-mile. It is practicable to compile such information, and plans for obtaining it have been worked out, but doubt as to whether this information is worth the added clerical cost has so far prevented the Interstate Commerce Commission from issuing an order requiring such a report. In the following tables no figures are given showing the average revenue per ton, because such an average without the length of haul is likely to be misleading, although in studying the relation of freight rates to values of commodities, average revenue without the average haul has some significance."

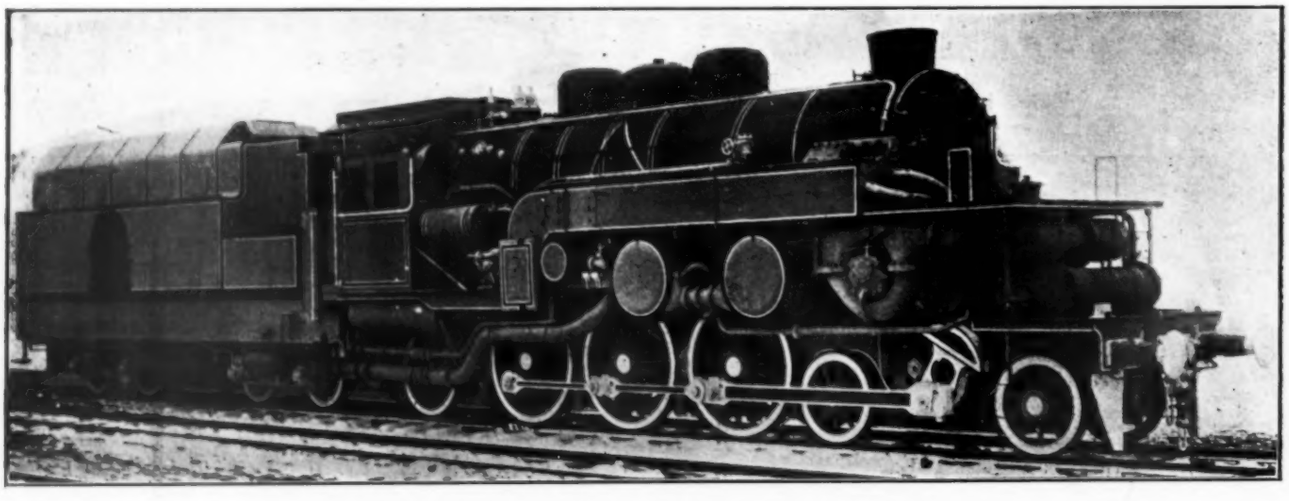
The figures for the United States omitting the district figures, are as follows:

TONNAGE AND ESTIMATED FREIGHT REVENUE BY CLASSES OF COMMODITIES, CLASS I RAILWAYS, 1923

Commodity	Cars originated	Tons originated	Total cars moved	Total tons carried	Estimated revenue (thous.)	Per cent of total revenue
PRODUCTS OF AGRICULTURE—						
Wheat	572,394	23,095,399	916,154	36,802,756	$93,019	2.0
Corn	400,723	15,174,321	709,545	26,357,927	58,240	1.3
Oats	267,324	8,296,102	549,254	16,848,236	34,817	.8
Other grain	138,269	4,738,482	247,954	8,251,685	18,753	.4
Flour and meal	419,113	10,481,744	976,107	24,772,004	50,181	1.1
Other mill products	456,035	9,988,180	1,001,943	22,269,390	38,907	.8
Hay, straw and alfalfa	483,675	5,965,625	876,126	10,877,218	26,751	.6
Tobacco	101,232	1,097,284	165,781	1,858,552	9,750	.2
Cotton	254,649	2,874,846	566,662	7,084,173	36,247	.8
Cotton seed and products, except oil	157,615	3,553,062	249,798	5,673,006	11,636	.2
Citrus fruits	101,785	1,530,953	455,885	6,923,603	50,191	1.1
Other fresh fruits	373,620	5,244,463	1,199,666	16,950,113	121,351	2.6
Potatoes	262,773	4,696,605	693,179	12,630,646	40,860	.9
Other fresh vegetables	193,141	2,468,158	587,819	7,364,116	37,979	.8
Dried fruits and vegetables	46,132	1,134,339	118,031	2,937,171	14,074	.3
Other products of agriculture	296,523	8,848,508	482,050	12,917,491	29,677	.6
Total	4,525,003	109,188,071	9,795,954	220,518,087	672,433	14.5

Commodity	Cars originated	Tons originated	Total cars moved	Total tons carried	Estimated revenue (thous.)	Per cent of total revenue
ANIMALS AND PRODUCTS—						
Horses and mules	53,563	605,189	86,099	998,293	4,567	.1
Cattle and calves	815,362	9,403,092	1,159,213	13,318,368	54,140	1.2
Sheep and goats	119,124	1,159,056	193,112	1,919,959	10,565	.2
Hogs	727,509	6,947,056	932,128	9,092,650	37,143	.8
Fresh meats	235,349	3,022,366	550,070	6,919,808	43,994	1.0
Other packing house products	147,032	2,395,329	323,911	5,350,470	28,023	.6
Poultry	31,878	356,526	112,203	1,220,403	11,221	.2
Eggs	52,756	594,671	136,439	1,561,736	12,677	.3
Butter and cheese	45,145	571,034	115,173	1,478,929	11,591	.3
Wool	23,460	289,998	60,285	754,370	5,247	.1
Hides and leather	52,908	1,083,919	126,815	2,690,910	10,542	.2
Other animals and products	104,071	1,811,261	202,161	3,572,463	13,020	.3
Total	2,408,158	28,237,497	3,997,609	48,878,359	242,730	5.3
PRODUCTS OF MINES—						
Anthracite coal	1,751,266	84,864,643	2,905,875	140,005,875	226,933	4.9
Bituminous coal	6,996,303	358,870,454	13,551,956	692,455,537	856,242	18.5
Coke	800,402	27,837,766	1,313,255	45,961,824	64,762	1.4
Iron ore	1,481,519	77,816,342	2,315,353	128,017,928	89,854	1.9
Other ores and concentrates	205,396	10,452,563	406,227	20,257,315	22,090	.5
Base bullion and matte	17,906	812,503	55,335	2,479,857	8,036	.2
Clay, gravel, sand and stone	2,728,065	133,984,812	3,784,593	182,308,338	120,889	2.6
Crude petroleum	231,597	8,335,653	413,363	14,610,221	33,725	.7
Asphaltum	61,891	2,099,866	151,603	5,156,810	9,672	.2
Salt	127,283	3,382,787	323,989	8,644,141	17,125	.4
Other products of mines	114,711	4,926,390	250,709	10,420,906	17,264	.4
Total	14,516,339	713,383,779	25,472,258	1,250,314,752	1,466,592	31.7
PRODUCTS OF FORESTS—						
Logs, posts, poles and cord wood	1,732,970	47,182,544	1,808,274	54,341,212	44,760	1.0
Ties	220,879	6,660,375	399,238	12,048,853	22,119	.5
Pulp wood	176,466	5,367,114	340,918	9,886,449	8,651	.2
Lumber, timber, box shooks, staves and headings	1,986,951	53,181,012	5,326,118	140,902,119	329,574	7.1
Other products of forests	135,128	2,829,007	255,761	5,392,234	14,703	.3
Total	4,062,394	115,220,052	8,130,309	222,570,867	419,807	9.1
MANUFACTURES AND MISCELLANEOUS—						
Refined petroleum and its products	11,306,390	36,401,305	2,728,440	76,213,050	206,264	4.5
Vegetable oils	35,504	967,016	90,440	2,479,693	7,804	.2
Sugar, sirup, glucose and molasses	177,301	4,880,674	428,729	11,916,178	41,629	.9
Boats and vessel supplies	2,605	45,934	4,480	74,332	309	[1]
Iron, pig and bloom	309,145	14,948,481	519,866	24,684,399	28,257	.6
Rails and fastenings	76,772	3,187,168	152,514	6,332,424	12,387	.3
Bar and sheet iron, structural iron and iron pipe	915,392	29,964,965	1,810,066	59,557,334	156,158	3.4
Other metals, pig, bar and sheet	145,745	5,294,261	319,606	11,254,841	27,931	.6
Castings, machinery and boilers	290,800	5,893,318	623,981	12,537,127	44,198	1.0
Cement	552,987	21,108,633	1,102,513	42,060,934	50,018	1.1
Brick and artificial stone	532,613	18,793,112	860,046	30,394,350	35,406	.8
Lime and plaster	231,415	6,121,664	452,408	12,376,279	20,366	.4
Sewer pipe and drain tile	120,280	2,218,395	210,741	3,949,519	6,804	.1
Agricultural implements and vehicles other than automobiles	177,438	2,596,205	346,949	5,162,310	19,853	.4
Automobiles and autotrucks	797,307	6,549,729	1,991,350	16,441,490	142,319	3.1
Household goods and second-hand furniture	69,872	686,090	130,088	1,280,097	6,514	.1
Furniture (new)	98,462	881,037	246,607	2,211,970	14,840	.3
Beverages	36,620	681,680	68,464	1,288,201	4,390	.1
Ice	198,052	5,116,349	218,286	5,713,263	4,959	.1
Fertilizers (all kinds)	328,051	7,641,306	472,114	11,186,956	18,558	.4
Paper, printed matter and books	120,777	2,912,217	361,042	8,737,670	23,755	.5
Chemicals and explosives	289,815	8,755,846	582,920	17,415,692	42,673	.9
Textiles	82,488	953,025	182,416	2,201,311	10,141	.2
Canned goods (all canned food products)	150,061	3,439,880	337,252	7,927,667	30,742	.7
Other manufactures and miscellaneous	3,220,785	76,937,360	6,333,051	144,518,187	362,836	7.8
Total	10,266,677	266,975,650	20,574,369	517,915,274	1,319,111	28.5
Grand total, carload traffic	35,778,571	1,233,605,049	67,970,499	2,260,197,339	4,120,673	89.1
Merchandise—all l.c.l. freight	.....	44,313,682	.....	73,589,705	503,726	10.9
Grand total, carload and l. c. l. traffic	.....	1,277,318,731	.....	2,333,787,044	4,624,399	100.0

[1] Less than 0.1 per cent.



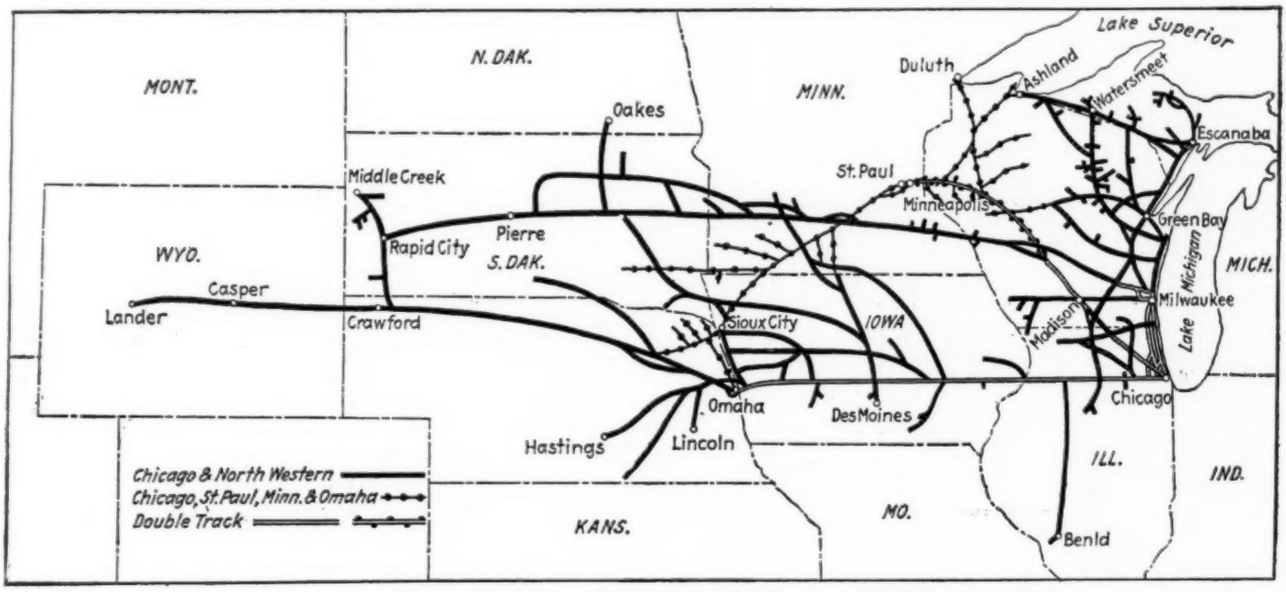
Gilliams Service

Turbine Locomotive Built by German Firm of Krupp

North Western Reports Decrease in Net Income

Net After Fixed Charges in 1923 Less Than in 1922 in Spite of Heavy Increase in Traffic

REVENUE TONS of freight carried by the Chicago & North Western in 1923 exceeded those of 1922 by 19.75 per cent. There was an increase as between the two years of 22.02 per cent in revenue ton-miles which, in fact, were the greatest in North Western history with the single reported exception of 1920. The word "reported" is here used because figures for 1918 have never been shown in the North Western annual reports, and therefore comparison with that year is impossible. In 1923 as compared with 1922, there was an increase of 12.31 per cent in freight revenue and of 9.81 per cent in total revenues. Notwithstanding these facts, the North Western earned net operating income or net after equipment and joint facility rents approximately $1,200,000, or 7 per cent less than in 1922 while net after fixed charges was $160,000 or 2 per cent less than in the preceding year. The Chicago, St. Paul, Minneapolis & Omaha reported approximately the same trends of traffic and earnings in 1923 as did the parent Chicago & North Western and its net after fixed charges was the lowest in many years of the company's history with the exception of 1921.



The Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha

The Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha alike have ever since the beginning of federal control reported plainly unsatisfactory financial results. In each year there have been certain handicaps to act as a deterrent on contemplated recovery with the result that the degree of recovery from the federal control period has been slow.

Reductions in Dividends

The situation is shown most pointedly by the several reductions in the dividend rates that have taken place in the past four years. The Chicago & North Western now pays 7 per cent on its preferred stock and 3 per cent on its common. The 7 per cent rate on the preferred dates back to 1878. From 1902 to 1919, however, stockholders received an extra dividend of one per cent which made the rate on the preferred 8. From 1902 to 1919, when the preferred was receiving this rate of 8 per cent, the dividend on the common stock was 7 per cent. At the same time the extra of one per cent on the preferred was omitted the rate on the common was reduced to 5 per cent and in 1923 it was again reduced to 3 per cent. Dividends in 1917, which was a good year, totaled $11,859,848 and there was a balance after dividends of about $5,300,000. Dividends in 1923 at the rate of 7 per cent on the preferred and on the common at the rate of 2½ per cent for the first half year and at the rate of 1½ for the second half, or a total of 4 per cent, totaled $7,373,750 and the balance after dividends was only $1,363,718. The Chicago, St. Paul, Minneapolis & Omaha, which the Chicago & North Western controls by stock ownership, has until recently been paying 7 per cent on its preferred and 5 per cent on its common. These dividends totaled approximately $1,700,000. The company failed to earn them in 1921 and again in 1922 and they were paid from surplus. For the second half of 1923 the dividend was passed. The dividends in 1923 totaled 7 per cent on the preferred and only 2½ per cent on the common and amounted to $1,252,068. Inasmuch as net after charges amounted only to $624,173, even these dividends were not earned and there was a loss after their payment of $627,896.

Effect of Rate Reductions

It is typical of North Western fortunes in recent years that although it carried 22.02 per cent more revenue ton-miles in 1923 than in 1922, its freight revenues exceeded those of 1922 by but 12.31 per cent. The revenue per ton per mile in 1923 was 1.223 cents whereas in 1922 it was 1.329 cents. This decrease is explained partly by the fact that a large proportion of the increased traffic was in low grade commodities and it was partly due to rate reductions. For

instance, the reduction in rates which was effective on July 1, 1922, affected only part of the traffic of that year but all of the traffic on which the rates in question applied in 1923. The North Western is the typical "granger" road, and has suffered from all the combination of especially adverse conditions that have affected the "granger" roads. Furthermore, it suffered a rate reduction on iron ore effective May 15, 1923. President W. H. Finley in his annual report to the stockholders says with reference to this rate reduction, "It deprived your company of approximately one million dollars in revenue that would have been received under rates in effect prior to the above date, with the result that, while the company handled 10,266,799 tons of ore in 1923, or about 12 per cent more than in 1922, it earned about $114,000 less revenue thereon than was earned on the smaller tonnage of the previous year." Iron ore constituted 17.64 per cent of the road's total 1923 revenue tonnage.

Revenues and Expenses in 1923

Chicago & North Western operating revenues in 1923 totaled $160,425,965 as compared with $146,100,437 in 1922, an increase of $14,325,528 or 9.81 per cent. Total operating expenses were $132,507,531 as compared with $119,191,134 in 1922, an increase of $13,316,397, or 11.17 per cent. The larger part of the increase in expenses was in the maintenance accounts. Expenses for maintenance of way and structures showed an increase of $4,044,381 or 21 per cent. The increase in expenses for maintenance of equipment totaled $5,463,992, or approximately 18 per cent. This was about in line with the increase for the roads of the country as a whole, which increase was 17.1 per cent. The North Western's equipment maintenance expenses in 1923 were, however, 27.11 per cent of total operating revenues.

The increase in transportation expenses in 1923 as compared with 1922 was $3,451,892 or 5½ per cent. This increase was not large compared with an increase of 22.02 per cent in revenue ton miles.

Decrease in Earning Power

The Chicago & North Western has suffered like its neighbor roads in the northwestern region from its rate situation. The revenue per ton-mile in 1923 was 41 per cent in excess of that of 1914, an increase larger than reported by some of the other roads in the northwestern region but still too small in itself to meet such increased costs as have occurred. The comparatively small increase in the rate level over the pre-war period and increased costs combined have succeeded in seriously reducing the North Western's former recognized earning power. This has been shown by the decrease in net after charges. It is also shown by the decrease in net operating income. The North Western's standard return for operations during federal control, based on the annual average net operating income for the three years ended June 30, 1917, was $23,201,016. Net operating income in 1923 was $15,843,375. That in 1922 was $17,036,305. The 1923 net operating income was equivalent to but 68 per cent of the standard return. In the case of the Omaha, the situation is similar. The standard return for that property was $4,934,790. Net operating income in 1922 was $3,812,671 and in 1923, $3,028,915. The 1923 figure was only 62 per cent of the standard return.

Additions and Betterments

Expenditures for additions and betterments on the North Western in recent years have not been great. Expenditures for additions and betterments in 1923, however, were large. Net additions to investment in road and equipment totaled $27,442,574 as compared with but $1,791,538 in 1922 or

TABLE I—CHICAGO & NORTH WESTERN OPERATING RESULTS, SELECTED ITEMS, 1914 TO 1923

Year ended June 30	Mileage	Revenue tons	Revenue ton-miles	Average haul	Revenue per ton-mile cents	Revenue train load	Revenue car load	Total operating revenues	Total operating expenses	Net operating revenue	Operating ratio	Net after charges
1914	8,071	43,309,643	6,229,944,000	144	0.87	348	18.44	$83,677,051	$59,405,142	$24,271,909	70.99	$12,306,142
1915	8,108	40,399,215	6,216,281,000	154	0.84	443[2]	21.11[2]	80,779,675	56,371,573	24,408,102	69.78	11,914,049
1916	8,108	51,238,459	7,412,266,000	145	0.81	491[2]	22.06[2]	91,313,866	61,952,329	29,361,537	67.85	17,282,510
Year ended Dec. 31												
1916	8,108	56,407,915	8,130,953,000	144	0.80	510[2]	22.66[2]	97,978,844	65,120,827	32,858,017	66.46	20,368,924
1917	8,108	60,288,051	9,220,973,000	153	0.78	544[2]	24.62[2]	108,264,983	78,758,989	29,505,995	72.75	17,125,031
1918	8,090	(1)	(1)	(1)	(1)	(1)	(1)	127,295,678	109,498,572	17,797,106	86.2	14,482,711
1919	8,090	51,981,263	8,294,483,000	160	1.110	450	20.05	(1)	(1)	(1)	(1)	13,982,582
1920	8,298	60,275,207	9,559,270,000	159	1.156	453	21.60	165,692,399	157,110,200	8,582,199	94.2	12,545,857
1921	8,403	39,227,758	6,775,908,000	173	1.412	383	19.35	144,775,476	129,091,428	15,684,048	89.17	def.1,245,433
1922	8,404	48,607,124	7,579,554,000	156	1.329	430	20.07	146,100,437	119,191,134	26,909,303	81.58	8,897,536
1923	8,463	58,207,915	9,248,615,000	159	1.223	456	20.48	160,425,965	132,507,531	27,918,434	82.60	8,737,468

(1) Figures not available in annual reports.
(2) Figures include non-revenue freight.

TABLE II—CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA OPERATING RESULTS, SELECTED ITEMS 1914 TO 1923

Year ended June 30	Mileage	Revenue tons	Revenue ton-miles	Average haul	Revenue per ton-mile cents	Revenue train load	Revenue car load	Total operating revenues	Total operating expenses	Net operating revenue	Operating ratio	Net after charges
1914	1,748	8,466,632	1,294,143,000	153	0.880	307	19.23	$18,210,083	$12,834,117	$5,375,966	70.48	$2,021,615
1915	1,753	8,794,488	1,336,106,000	152	0.860	360[2]	20.39[2]	17,841,348	12,107,598	5,733,750	67.86	2,219,085
1916	1,753	10,082,061	1,578,936,000	157	0.810	390[2]	21.30[2]	19,522,562	12,958,838	6,563,725	66.38	3,003,027
Year ended Dec. 31												
1916	1,753	10,699,463	1,714,280,000	160	0.810	414[2]	21.95[2]	20,855,286	13,608,879	7,246,407	65.25	3,714,975
1917	1,749	10,695,384	1,678,231,000	157	0.830	429[2]	23.07[2]	21,476,509	15,841,313	5,635,196	73.76	2,118,589
1918	1,749	(1)	(1)	(1)	(1)	(1)	(1)	24,829,981	20,884,199	2,624,720	....	2,406,180
1919	1,749	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	2,376,718
1920	1,749	11,121,752	1,781,517,000	160	1.171	412	22.97	26,489,817	23,767,081	2,722,736	89.72	2,587,670
1921	1,749	8,631,370	1,345,870,000	155	1.433	356	20.70	28,137,408	24,392,314	3,745,093	86.69	—285,677
1922	1,749	9,516,320	1,479,069,000	155	1.325	421[2]	22.86[2]	27,801,007	22,297,050	5,503,956	80.20	1,177,929
1923	1,749	10,511,198	1,612,951,000	153	1.245	434[2]	22.73[2]	28,363,234	23,516,147	4,847,087	82.91	624,173

(1) Figures not available in annual reports.
(2) Figures include non-revenue freight.

with $12,030,791 in 1921. The 1923 figure, prior to deductions for retirements, was $31,445,462, divided $9,134,648 for road and $22,310,814 for equipment. The expenditures for new equipment exceeded those of any other two years in North Western history. The new equipment included 150 locomotives, 250 passenger train cars and 6,635 freight train cars. There were 46 locomotives, 10 passenger train cars and 3,019 freight train cars retired during the year. The expenditures for road included grade separation work at Milwaukee, Wis.; Clinton, Ia., and Chicago, the addition of ten stalls to the enginehouse at Casper, Wyo., the lengthening of eight stalls in the enginehouse and certain other related improvements at Chadron, Neb., a new engine terminal with a 29-stall enginehouse at Monona Yard, Madison, Wis., new coaling stations at a number of points, new water treating plants. etc. One important new project was the installation of a new superstructure on the old piers of the bridge across the Missouri river at Blair, Neb. A number of grade revision projects were carried out on the Wyoming division.

The North Western at this time is understood to be contemplating a closer union of the North Western itself and the Omaha, and steps to that end are evidenced in the recent merger of the purchasing departments and the extension of the authority of the North Western traffic department head to include the Omaha. One suggestion talked of is a change in the operating organization whereby there would be two grand divisions. At present the line from Chicago to the Twin Cities and also the line from the Twin Cities to Omaha are each for part of their length under the North Western and for the other part under the Omaha. The new method of organization would place each of the two lines completely in one or the other of the proposed grand divisions. Economies are expected in operation and presumably would be developed in other directions.

The Chicago & North Western so far this year has reported much better net than it had shown up to this time last year, in which respect it differs from most of its neighbors. The difficulty is that the favorable conditions of the first three months of the year have not been carried into April. This means, therefore, that the figure for the first four months—the latest at present available—include three good months and one poor month. Net operating income for the first four months of 1924 totaled $3,753,668 as compared with $2,688,381 for the same period of last year. In April, however, net was only $240,505 as compared with $698,048 in April, 1923.

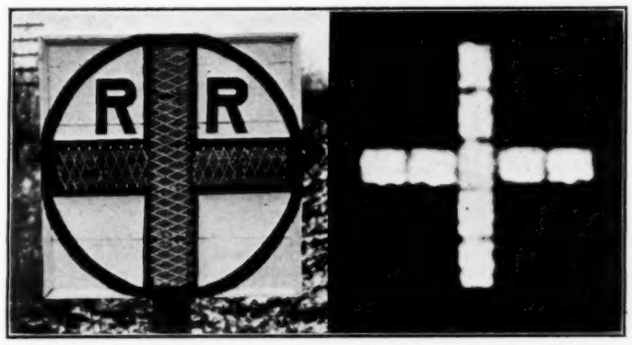
For the Omaha, net operating income for April, 1924, was $175,072 as compared with $342,631 in April, 1923. For the first four months of 1924 net was $1,004,875 in 1924, as compared with $923,613 for the first four months of 1923.

A Light Reflecting Prism for Railroad and Crossing Signs

THE WELL-KNOWN and marked light reflecting property of glass prisms has received its most recent and one of its most novel applications in the introduction of a special glass for use on warning boards at highway crossings and various other railroad information signs along the right-of-way. The new invention consists essentially of pressed glass with the front face made smooth but with the back face so shaped as to form a series of square prisms, each about one-quarter inch in depth. These prisms are set in an angular position to the face of the glass, thereby forming a natural reflecting surface of marked intensity which will throw directly back to their source rays of light reaching the glass from an angle as great as 42½ deg. from the face of the reflector. This wide range of reflecting power through a total angle of about 85 deg. adapts the glass to uses where the sign, to be effective, must be seen from varying directions, and since a fine adjustment to the line of approach is unnecessary, it is adapted equally well for installation at some distance at the side of a crossing or above the line of vision as directly in front.

In this form of reflector, no quicksilver is required but the reflecting power is none the less intense as is illustrated by one of the photographs which is a four-second exposure of the reflection of a crossing sign illuminated only by normal automobile headlights 250 ft. distant. In practice with normal headlights the distance of visibility has been found to exceed 1,200 ft. A remarkable property of the new glass is that dust or dirt collecting on the back side of the glass has no effect upon its reflecting power, the only requirement being to so mount the prisms as to permit the smooth front face to be washed off by rains.

The photographs bring out a further feature of the new development by illustrating their adaptability to uses where it



A Crossing Sign Fitted with Stimsonite Reflectors—The Same Sign at Night, Illuminated by the Approach of an Automobile

is desired to maintain a conventional symbol. In this case the sign conforms to the crossing symbol although any other form of symbol or letters can be made by a proper arrangement of the prism units. As the illustrations show further, it is possible to maintain a combination day and night sign with the assurance that the symbol will show as vividly, if not more so, at night as in the day. It may thus be employed as a marker on crossing gates and on center posts or close clearances on overhead bridges at grade separations, also for flag station signals, speed markers, yard limit markers and similar purposes on railroads wherever an indication clearly visible at 2,000 ft, meets the requirements. The prisms in the installation illustrated are of clear, uncolored glass but they are also manufactured in amber, ruby or other colors of glass, depending on the special use for which they are desired. The new material is known as "stimsonite," is a product of the Stimson Reflector Company, St. Louis, Mo., with the Railway Equipment Company, St. Louis, Mo., in charge of railway sales. Among other roads the Missouri Pacific, the Rock Island, Pennsylvania and Wabash now have Stimsonite signs under test.

AN ATTRACTIVE BULLETIN board is a vital factor in safety. Many accidents are preventable by education. Safety bulletins should be prominently displayed to get best results. Committeemen should watch the safety bulletin boards and call the attention of others to them. Where they are found untidy and to contain obsolete bulletins report should be made to the committee chairman. —*A. C. L. Circular.*

Rail Production Greater in 1923

THE PRODUCTION of steel rails in 1922 was 2,904,516 gross tons, as compared with the total of 2,171,776 tons in 1922, according to statistics issued by the American Iron and Steel Institute. The output of rails in 1923 is the largest since 1917. However, there have been eight years since 1902 when the total production exceeded that of last year.

Another fact brought out in the statistics is that 139,742 tons of rail were rerolled from old rail, this being the largest output of this branch of the industry since 1916, when the total was 144,826 tons.

There has been a marked reduction in the rolling of alloy steel rails. Thus in 1923, the total output of all alloy steel rails was 2,142 gross tons, a reduction of 1,021 tons, or nearly one-third from that of 1922 and almost a negligible quantity as compared with 257,324 tons in 1910.

PRODUCTION OF RAILS BY WEIGHTS AND PROCESSES, 1923

	Under 50 lbs.		50 to 84 lbs.		85 to 99 lbs.		100 lbs. and over		Total	
Kinds	Gross tons	Per cent	Gross tons	Per cent	Gross tons	Per cent	Gross tons	Per cent	Gross tons	Per cent
Open-hearth	155,124	56.86	282,169	93.77	836,160	96.67	1,465,326	99.96	2,738,779	94.29
Bessemer	5,728	2.10	17,229	5.73	2,514	.29	406	.03	25,877	.89
Other	111,942	41.04	1,509	.50	26,291	3.04	118	.01	139,860	4.82
Total	272,794	100.00	300,907	100.00	864,965	100.00	1,465,850	100.00	2,904,516	100.00

PRODUCTION OF RAILS BY PROCESSES, GROSS TONS, 1909-1923

Years	Open-hearth	Bessemer	Rerolled*	Electric	Iron	Total
1909	1,256,674	1,767,171	.....	†.....	.....	3,023,845
1910	1,751,359	1,884,442	.....	†.....	230	3,636,031
1911	1,676,923	1,053,420	91,751	462	234	2,822,790
1912	2,105,144	1,099,926	119,390	3,455	.....	3,327,915
1913	2,527,710	817,591	155,043	2,436	.....	3,502,780
1914	1,525,851	323,897	95,169	178	.....	1,945,095
1915	1,775,168	326,952	102,083	.....	.....	2,204,203
1916	2,269,600	440,092	144,826	.....	.....	2,854,518
1917	2,292,197	533,325	118,639	.....	.....	2,944,161
1918	1,945,443	494,193	101,256	.....	.....	2,540,892
1919	1,893,250	214,121	96,422	50	.....	2,203,843
1920	2,334,222	142,899	126,698	297	.....	2,604,116
1921	2,027,215	55,559	96,039	5	.....	2,178,818
1922	2,033,000	22,317	116,459	.....	.....	2,171,776
1923	2,738,779	25,877	139,742	118	.....	2,904,516

*Rerolled from old steel rails. Included with Bessemer and open-hearth steel rails in 1909 and 1910. †Small tonnages rolled in 1909 and 1910, but included with Bessemer and open-hearth rails for these years.

The statistics show the general tendency toward the use of heavier sections. As shown in one of the tables, there has been a large increase in the production of rails weighing 100 lb. or more per yard. In 1923 rails of this class totaled 1,465,850 tons, an increase of 562,950 tons over 1922, or 62.4 per cent, whereas the rails weighing 85 lb. and less than 100 lb. per yard totaled 864,965 tons in 1923, an increase of only 136,361 tons, or 18.7 per cent.

PRODUCTION OF RAILS BY WEIGHT PER YARD, 1907-1923

Years	Under 45 pounds	45 and less than 85	85 and less than 100	100 pounds and over	Total gross tons
1907	295,838	1,569,985	1,767,831		3,633,654
1908	183,869	687,632	1,049,514		1,921,015
1909	255,726	1,024,856	1,743,263		3,023,845
1910	260,709	1,275,339	2,099,983		3,636,031
1911	218,758	1,067,696	1,536,336		2,822,790
1912	248,672	1,118,592	1,960,651		3,327,915
1913	*270,405	†967,313	2,265,062		3,502,780
1914	*238,423	†309,865	868,104	528,703	1,945,095
1915	*254,101	†518,291	742,816	688,995	2,204,203
1916	*295,535	†566,791	1,225,341	766,851	2,854,518
1917	*308,258	†882,673	989,704	763,526	2,944,161
1918	*395,124	†665,165	288,141	592,462	2,540,892
1919	*263,803	†495,577	965,571	478,892	2,203,843
1920	*489,043	†433,333	952,622	729,118	2,604,116
1921	*211,568	†214,936	902,748	849,566	2,178,818
1922	*265,541	†274,731	728,604	902,900	2,171,776
1923	*272,794	†300,907	864,965	1,465,850	2,904,516

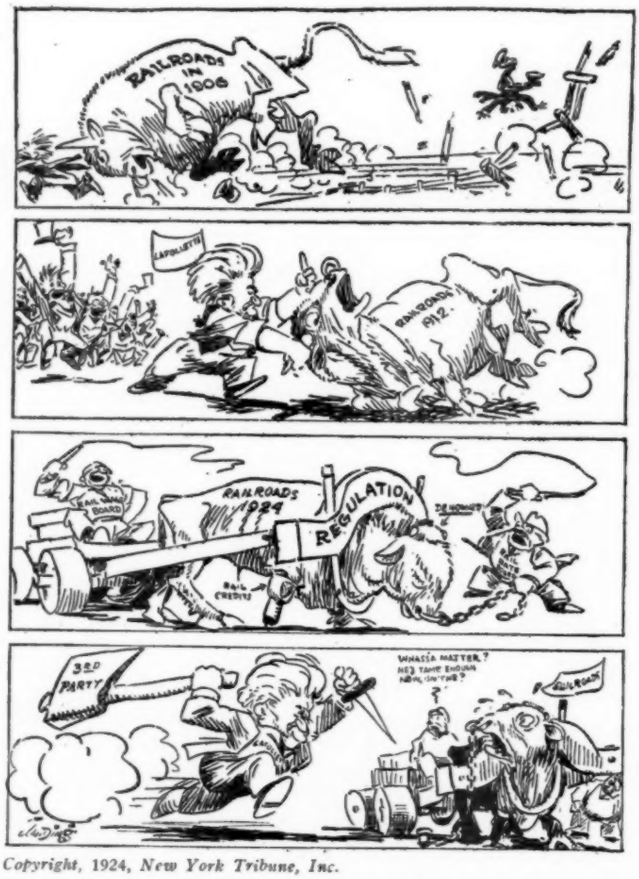
*Includes rails under 50 pounds. †Includes 50 pounds and less than 85 pounds.

Of the total output, 573,701 tons comprise rails weighing less than 85 lb. per yard, which are purchased almost entirely by industrial plants, mines, contractors, logging railways, etc. In addition, although probably representing some overlap, 130,056 gross tons were rolled into girder or high T rails for electric and street railways.

The statistics for 1923 show a further reduction in the rolling of Bessemer rails, for of the total only 25,877 tons were of Bessemer steel. However, when we consider the figures as applying to those weights of rail normally purchased by the railroads, namely, rails weighing 85 lb. or more per yard, we find that only 2,920 tons were of Bessemer steel.

PRODUCTION OF ALLOY-TREATED STEEL RAILS, 1913-1923

		Production by alloys		Production by processes		Production by weight, per yard			
Years	Total production gross tons	Titanium	Other alloys	Open-hearth and elect.	Bessemer	Under 50 lbs.	50 and under 85 lbs.	85 and under 100 lbs.	100 lbs. and over
1913	59,519	47,655	11,864	33,567	25,952	91	9,414	50,014	
1914	27,937	23,321	4,616	27,447	490	14	1,168	8,301	18,454
1915	24,970	21,191	3,779	24,367	603	6	1,977	6,555	16,432
1916	28,562	26,493	2,069	27,675	887	...	1,761	10,506	16,295
1917	16,535	15,273	1,262	16,535	....	...	335	6,671	9,529
1918	3,111	2,891	220	3,111	....	...	47	2,640	424
1919	6,476	6,207	269	6,476	....	...	....	3,920	2,556
1920	12,909	11,652	1,257	12,909	....	...	514	5,069	7,326
1921	6,276	2,804	3,472	6,276	....	...	71	4,277	1,928
1922	3,163	2,493	670	3,163	....	...	321	835	2,007
1923	2,142	346	1,796	2,142	....	...	56	317	1,769



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If Battling Bob Really Must Fight Again, Why Not Get a New Bull?

General News Department

The Broadway Limited of the Pennsylvania Railroad, westbound, was derailed near Lancaster, Pa., on July 3 because, it is supposed, of a broken truck. The engine, the tender and the rear car remained on the rails. Three persons were injured, two women in one of the sleeping cars and one trainman; all of the injuries being reported as slight.

Electric lights are required in the marker and classification lamps of locomotives in Canada by an order issued by the Board of Railway Commissioners on June 6. The order applies to all new engines that have electric light installations, and to all locomotives after December 31, 1925. This order is made on the basis of a hearing held last February, in which the brotherhoods claimed that oil lamps were not reliable and usually were not well maintained.

Early Confirmation of C. P. R. Electrification Rumors Expected

Official announcement of plans for the electrification of its heaviest grades through the Rocky mountains is expected at any time from the officers of the Canadian Pacific, according to reports from Ottawa. Several surveys of that region have already been completed and the project has been under consideration for some time. It will be the most elaborate project of that railway in the Rocky mountains since the Connaught tunnel which pierced the Rockies, eliminating costly grades and fifty miles of snow sheds. Hydro-electric generation involves little more than selection, there being a large number of great falls in that district.

P. R. R. Officer to Survey Condition of Alaska Railroad

Secretary of the Interior Work has announced the appointment of Noel W. Smith, assistant to the general manager of the Pennsylvania (Eastern Region), as special assistant to the Secretary of the Interior to make a detailed study of the Alaska Railroad. Mr. Smith, who has been granted a leave of absence, will proceed at once to Alaska, where he will serve as a personal representative of the secretary in the supervision of construction, operation and maintenance, finance, the personnel and other activities. Mr. Smith's appointment contemplates the making of a complete survey of the road and such reorganization as may be necessary for its betterment.

Increase in Estimated Treasury Surplus

An increase in the actual over the estimated surplus in the federal treasury for the fiscal year ended June 30 is explained by Secretary Mellon in part by the fact that "railroad securities heretofore acquired by the government could be refunded at lower interest rates by the railroads, and were, therefore, paid off or purchased, and instead of a net cash outgo in the railroad account there was a net cash income, making a difference of some $120,000,000 over the earlier estimate." This, with some other minor items, gave a net increase of actual over-estimated surplus of $175,727,362, making the surplus $505,366,986. The railroad securities referred to are mainly those given by the railroads in funding their indebtedness to the government for additions and betterments made during the period of federal control.

$56,000,000 C. N. R. Appropriation Approved by Committee

The House Committee on National Railways and Shipping of the Canadian Parliament has approved the appropriation of $56,000,000, covering interest on securities, equipment, principal payments, operating income deficit, construction and betterments, included in the estimates of the Department of Railways and Canals for the Canadian National Railways for the fiscal year ending March 31, 1925. This item will be included in the report of that committee to the House where there will probably be considerable debate before final passage.

At the meeting of the committee, when this appropriation was passed, Sir Henry Thornton, president of the Canadian National in explaining the item of $1,064,000 for advertising last year, said the actual cash outlay for advertising was $789,000, the balance being represented by transportation issued. Newspaper advertising last year cost $84,556 in Canada and $101,000 in the United States. More money was spent on newspaper advertising in the United States than in Canada as a large proportion of tourist traffic was drawn from the United States.

In reply to questions by Sir Henry Drayton, Sir Henry Thornton said he did not think the C. N. R. was making money on the passenger business. A similar condition, he thought, prevailed on the other roads in America, with the exception of those operating through thickly populated regions. The general view held by railway men was that passenger business was unremunerative in comparison with freight business. Sir Henry informed the committee that the cost of railway construction had practically tripled since the pre-war period. He estimated the cost at $75,000 a mile generally, and at about $50,000 a mile in the Prairie provinces.

Revenues and Expenses for May

Operating revenues of the Class I railroads, representing a mileage of 235,997 miles, totaled $477,229,000 in May, according to reports for the month compiled by the Bureau of Railway Economics. This was a decrease of $70,657,800 or 12.9 per cent as compared with the same month last year. Operating expenses totaled $381,253,200, a decrease of $39,998,000 or 9.5 per cent. The net operating income for May amounted to $60,595,197, compared with $90,252,652 in May last year, or a decrease of $29,657,455. In April, 1924, the net operating income was $61,821,900.

For the first five months this year Class I railroads had a net operating income of $325,172,660, which was at the annual rate of return of 4.27 per cent on their property investment, compared with $358,435,740 or 4.98 per cent for the same period last year. The percentage of return on property investment on an annual basis in each district was as follows:

New England Region	$13,103,358	4.31	per cent
Great Lakes Region	66,665,834	5.37	"
Central Eastern Region	68,556,265	4.47	"
Pocahontas Region	18,257,148	5.46	"
Total Eastern District	166,582,605	4.88	"
Total Southern District	60,128,016	5.42	"
Northwestern Region	20,184,620	2.09	"
Central Western Region	52,275,621	3.66	"
Southwestern Region	26,001,800	3.72	"
Total Western District	98,462,041	3.18	"
United States	325,172,662	4.27	"

Forty Class I carriers operated at a loss in May, of which 18 were in the Eastern district and 22 in the Western. In April there were also 40 roads which had operating deficits.

Maintenance expenses for both equipment and roadway totaled $178,656,563, nearly 11 per cent under those for May, 1923. For the first five months in 1924 these amounted to $853,988,810, a reduction of nearly 6 per cent.

The present report shows for carriers in the Eastern district a net operating income of $34,159,954 compared with $54,584,190 in May last year. Freight traffic was 18 per cent below May, 1923. Operating revenues $239,477,769, a decrease of more than 17 per cent.

For the Southern district the May record shows a net operating income of $10,512,000, compared with $11,340,444 in May last year; freight traffic 13 per cent under last year; operating revenues $64,571,771, a decrease of 7 per cent; operating expenses $50,070,700, a decrease of 6.4 per cent.

Carriers in the Western district had a net operating income in May of $15,923,240, compared with $24,328,000 for the same month last year; freight traffic decreased 6 per cent. Operating revenues totaled $173,179,480, a decrease of 8.3 per cent; operating expenses $143,840,980, or a decrease of 5.1 per cent.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1924

Name of road.		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures.	Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net operating income.	Net op. income 1923.
Akron, Canton & Youngstown	May	170	$204,341	$721	$212,516	$30,594	$27,180	$10,039	$56,586	$9,924	$134,323	63.20	$78,193	$65,151	$36,539	$61,597
	5 mos.	170	1,098,257	3,576	1,143,816	150,717	118,313	46,434	322,184	49,055	683,835	59.80	459,981	392,244	260,950	245,096
Alabama & Vicksburg	May	141	207,980	63,527	291,223	52,021	60,435	9,813	93,726	12,686	230,232	79.10	60,991	35,458	37,045	41,564
	5 mos.	141	1,049,832	305,252	1,453,390	252,437	284,556	48,050	497,120	67,076	1,158,870	79.70	294,520	176,923	194,582	214,658
Vicksburg, Shreveport & Pacific	May	188	232,844	87,643	343,086	58,868	50,812	11,904	121,328	14,843	259,628	75.60	83,458	60,383	48,622	46,941
	5 mos.	188	1,173,512	443,070	1,741,392	306,411	342,450	60,801	619,646	74,469	1,415,752	81.30	325,640	222,558	137,190	301,224
Ann Arbor	May	293	395,409	34,052	446,846	56,129	100,377	9,923	172,566	14,336	353,403	78.10	93,443	70,713	48,733	60,294
	5 mos.	293	1,998,683	192,509	2,276,964	215,901	489,620	46,393	996,567	72,456	1,821,070	80.00	455,894	347,709	185,373	—132,261
Atchison, Topeka & Santa Fe	May	9,040	9,856,269	3,685,901	14,885,849	3,196,890	3,803,776	280,678	4,942,667	352,221	12,451,393	83.60	2,434,456	1,504,390	1,553,133	3,491,363
	5 mos.	9,007	47,734,930	18,289,971	72,336,136	11,234,172	19,520,782	1,517,706	24,984,849	1,782,435	58,432,436	80.20	14,403,700	9,338,413	10,022,049	17,591,254
Gulf, Colorado & Santa Fe	May	1,908	1,480,087	319,398	1,926,821	497,494	537,844	47,903	683,362	64,809	1,826,046	94.80	100,775	14,665	—76,636	—12,726
	5 mos.	1,908	7,727,935	1,578,943	9,954,139	2,470,459	2,774,997	231,980	3,459,211	316,006	9,245,070	92.90	709,069	282,273	—114,091	359,510
Panhandle & Santa Fe	May	858	519,752	121,871	697,857	163,713	225,600	8,616	231,529	20,431	649,278	95.50	30,579	6,066	—38,673	14,579
	5 mos.	858	2,854,999	595,022	3,666,538	678,171	1,067,419	39,285	1,140,819	95,020	3,018,623	82.30	647,915	523,524	339,018	166,282
Atlanta & West Point	May	93	130,129	69,906	231,612	37,745	53,829	8,083	91,703	10,959	207,124	89.40	24,488	16,164	3,754	39,036
	5 mos.	93	696,745	363,041	1,218,877	167,192	227,517	42,159	449,127	54,746	962,570	78.90	256,307	191,134	129,979	172,199
Western of Alabama	May	133	157,863	66,678	249,318	33,432	62,245	10,825	79,260	10,702	200,831	80.50	48,487	35,727	31,093	43,825
	5 mos.	133	834,272	344,101	1,309,612	169,925	265,508	49,058	399,909	54,928	960,959	73.40	348,653	279,776	250,542	244,350
Atlanta, Birmingham & Atlantic	May	639	315,587	42,623	391,966	79,275	87,773	22,047	161,464	15,920	366,539	93.50	25,427	12,566	3,353	—35,120
	5 mos.	639	1,621,797	206,089	1,990,615	365,577	429,453	109,683	849,661	79,810	1,834,569	92.10	156,046	91,631	28,926	—132,369
Atlantic Coast Line	May	4,864	5,343,262	1,267,559	7,221,206	843,146	1,467,497	118,633	2,563,336	155,172	5,178,798	71.70	2,042,408	1,590,366	1,516,199	1,453,681
	5 mos.	4,864	26,608,481	8,914,306	38,615,563	4,143,888	7,073,159	627,798	13,085,280	764,779	25,923,397	67.10	12,692,166	10,534,388	9,838,496	9,385,875
Charleston & Western Carolina	May	342	263,124	31,094	310,237	73,412	46,609	7,859	134,239	7,068	269,187	86.80	41,050	23,348	12,340	41,811
	5 mos.	342	1,436,449	153,585	1,669,096	344,146	238,883	36,367	699,459	34,458	1,353,313	81.10	315,783	227,642	166,341	332,592
Baltimore & Ohio	May	5,303	14,740,997	2,349,587	18,360,021	2,206,623	3,541,756	372,756	7,061,825	513,465	13,838,697	75.40	4,521,324	3,677,806	3,389,509	4,297,175
	5 mos.	5,303	75,922,932	11,600,554	93,557,897	12,058,783	21,193,822	1,811,621	37,053,549	2,600,640	75,373,847	80.60	18,184,050	13,867,238	12,624,811	18,821,318
Baltimore & Ohio Chicago Term	May	80	.....	.....	294,518	70,224	52,076	1,898	170,932	9,616	294,415	100.00	103	—41,513	—7,145	46,736
	5 mos.	80	.....	.....	1,466,423	255,461	253,289	9,633	969,335	46,957	1,483,222	101.10	—16,799	—211,365	—38,829	216,970
Staten Island Rapid Transit	May	23	81,136	107,853	216,534	40,063	38,786	2,408	121,159	14,087	216,503	99.90	31	—14,527	—25,819	—4,872
	5 mos.	23	459,456	481,239	1,044,290	149,047	172,356	10,677	601,865	74,800	1,008,745	96.60	35,545	—43,454	—106,019	—158,682
Bangor & Aroostook	May	616	413,402	61,753	501,751	102,051	137,268	5,094	151,158	20,327	418,322	83.40	83,429	50,685	77,831	166,819
	5 mos.	616	2,838,505	372,833	3,324,067	524,009	703,123	21,591	910,007	101,441	2,268,348	68.20	1,055,719	812,431	948,141	734,605
Belt Ry. Co. of Chicago	May	32	.....	.....	540,380	74,065	56,108	2,774	256,932	8,959	398,838	73.80	141,542	95,208	135,657	155,055
	5 mos.	32	.....	.....	2,821,301	239,660	319,761	12,584	1,395,897	53,817	2,021,719	71.70	799,582	594,968	684,004	742,614
Bessemer & Lake Erie	May	228	1,611,120	20,705	1,657,395	186,287	471,063	20,176	412,980	29,362	1,113,713	67.20	543,682	501,171	500,431	929,806
	5 mos.	228	4,818,213	124,673	5,052,088	586,904	2,351,055	79,256	1,648,153	144,776	4,765,578	94.30	286,510	73,873	382,471	2,488,442
Bingham & Garfield	May	33	39,917	9	41,350	9,888	1,187	1,464	9,741	4,349	26,738	64.70	14,612	3,517	18,462	13,778
	5 mos.	34	183,140	10	190,868	33,751	30,652	7,948	51,664	20,812	145,812	76.40	45,056	—7,204	70,328	79,584
Boston & Maine	May	2,287	3,985,698	1,598,338	6,374,483	856,721	1,296,763	57,843	2,849,966	234,351	5,318,817	83.40	1,055,666	794,418	552,273	756,113
	5 mos.	2,287	19,767,114	8,639,358	32,264,720	4,069,625	6,819,539	262,834	14,854,836	1,158,845	27,276,355	84.50	4,988,365	3,762,268	2,642,557	—1,722,310
Brooklyn Eastern District Terminal	May	9	110,327	.....	116,103	6,291	11,780	334	44,111	5,423	67,939	58.50	48,164	40,762	43,002	52,010
	5 mos.	9	563,066	.....	600,524	47,425	57,621	2,179	221,711	26,683	355,619	59.20	244,905	208,284	214,364	301,812
Buffalo & Susquehanna R. R. Corp.	May	253	121,406	4,865	130,687	38,128	66,606	1,924	42,047	8,676	157,381	120.40	—26,694	—28,944	—2,829	72,405
	5 mos.	253	822,886	29,273	870,856	174,436	390,602	9,923	282,061	46,163	903,185	103.70	—32,329	—61,683	103,955	384,751
Buffalo, Rochester & Pittsburgh	May	591	1,022,378	127,764	1,220,098	82,399	338,408	30,081	489,836	37,938	980,866	80.40	239,232	209,119	218,602	300,233
	5 mos.	591	5,855,579	704,834	6,852,326	736,066	2,328,814	127,669	2,825,109	208,145	6,232,611	91.00	619,715	453,977	710,638	1,442,861
Canadian Pacific Lines in Maine	May	233	100,685	24,634	139,256	74,733	41,408	4,737	82,824	3,406	207,108	148.70	—67,852	—78,852	—90,902	—52,426
	5 mos.	233	1,111,449	193,889	1,386,994	198,398	271,649	22,784	595,124	17,732	1,105,687	79.70	281,307	226,307	157,918	147,728
Carolina, Clinchfield & Ohio	May	309	630,378	36,125	683,249	76,863	155,565	26,307	167,628	21,144	447,214	65.50	236,035	186,015	211,040	254,565
	5 mos.	309	3,244,306	192,902	3,514,362	388,696	877,377	131,060	968,497	102,300	2,466,617	70.20	1,047,745	797,530	1,027,847	1,149,092
Central of Georgia	May	1,920	1,477,648	405,196	2,107,879	363,406	394,786	70,592	822,667	91,528	1,752,584	83.10	355,295	256,509	252,652	262,948
	5 mos.	1,920	7,847,188	2,284,686	11,196,043	1,657,898	2,002,764	343,478	4,221,375	453,550	8,722,431	77.90	2,473,612	1,927,937	1,901,740	1,861,691
Central of New Jersey	May	691	3,615,421	759,417	4,657,169	494,322	1,124,074	37,130	1,814,247	107,910	3,596,326	77.20	1,060,843	679,388	611,517	584,140
	5 mos.	692	17,417,747	3,483,443	22,257,246	2,349,762	6,170,999	177,834	9,229,031	548,838	18,569,590	83.40	3,687,656	1,845,573	1,495,277	1,928,598
Central Vermont	May	434	588,660	88,483	753,750	181,366	120,685	13,384	329,550	23,413	669,871	88.90	83,879	64,798	34,632	114,839
	5 mos.	434	2,725,842	488,361	3,557,209	705,507	609,319	61,303	1,724,947	124,315	3,232,774	90.90	324,435	229,534	70,648	—132,355
Chesapeake & Ohio	May	2,558	7,373,746	908,538	8,678,790	1,106,691	2,416,723	100,921	2,634,157	203,524	6,495,732	74.80	2,183,058	1,808,108	1,979,980	1,983,764
	5 mos.	2,556	36,196,438	4,304,183	42,472,876	5,787,418	11,045,062	475,429	13,868,781	1,016,151	32,346,634	76.10	10,126,242	8,247,278	8,928,677	7,624,252
Chicago & Alton	May	1,050	1,740,549	513,599	2,465,781	473,762	552,493	60,712	907,884	59,933	2,037,363	82.60	428,418	335,226	230,389	362,763
	5 mos.	1,050	8,616,649	2,563,235	12,354,870	1,489,008	3,101,704	295,003	4,761,270	315,726	9,884,997	80.00	2,469,873	2,011,088	1,511,257	1,864,097

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1924—CONTINUED

Name of road.		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Maintenance of: Way and structures.	Equipment.	Operating expenses: Traffic.	Transportation	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net operating income.	Net op. income 1923.
Chicago & Eastern Illinois	May	945	$1,292,249	$381,664	$1,845,133	$208,302	$604,083	$52,146	$782,462	$62,990	$1,723,002	93.40	$122,151	$1,131	—$102,639	$189,824
	5 mos.	945	8,174,606	1,975,210	11,010,732	1,158,506	3,397,206	253,421	4,641,292	340,375	9,866,207	89.60	1,144,525	610,405	323,968	1,574,863
Chicago & North Western	May	8,462	8,267,523	2,226,193	11,908,713	2,532,485	2,691,923	171,102	4,948,259	355,569	10,752,447	90.30	1,156,266	403,542	388,652	1,049,981
	5 mos.	8,462	40,650,533	11,911,624	59,105,694	7,815,812	13,151,173	798,406	26,446,482	1,760,438	50,298,622	85.10	8,807,072	5,016,661	4,142,320	3,738,362
Chicago, Burlington & Quincy	May	9,405	8,929,889	1,972,303	12,106,746	2,091,655	2,905,354	224,248	4,397,750	355,442	10,039,798	82.90	2,066,948	1,173,738	1,002,352	1,036,762
	5 mos.	9,405	47,157,153	10,322,072	63,942,673	6,945,807	14,840,761	1,163,144	24,300,753	1,788,698	49,462,687	77.40	14,479,986	10,120,275	8,907,531	10,322,188
Chicago Great Western	May	1,496	1,450,660	285,524	1,909,638	375,582	410,006	66,997	803,313	54,025	1,722,821	90.20	186,817	113,755	35,516	149,122
	5 mos.	1,496	7,205,438	1,628,191	9,637,018	1,252,613	2,064,803	318,008	4,336,172	274,258	8,298,949	86.10	1,338,069	957,208	498,673	732,967
Chicago, Indianapolis & Louisville	May	654	948,964	316,998	1,420,490	173,189	301,380	33,483	511,889	33,288	1,074,775	75.70	345,715	273,113	125,703	225,526
	5 mos.	654	5,164,813	1,274,123	7,118,785	752,117	1,550,810	167,279	2,643,484	173,733	5,364,202	75.40	1,754,583	1,401,672	757,309	895,704
Chicago, Milwaukee & St. Paul	May	10,986	9,499,779	1,704,777	12,553,362	2,792,122	2,972,817	214,090	4,813,254	329,995	11,178,968	89.10	1,374,294	570,138	365,034	318,274
	5 mos.	10,986	46,931,945	9,093,327	62,706,480	9,319,067	15,437,247	948,973	26,268,996	1,674,486	53,930,722	86.00	8,775,758	4,791,263	3,140,663	5,357,033
Chicago, Peoria & St. Louis	May	247	73,133	10,804	93,269	22,919	14,537	1,985	51,928	7,875	99,244	106.40	—5,975	—9,525	—30,563	—29,782
	5 mos.	247	397,701	69,505	518,060	87,232	90,025	9,176	286,055	41,169	513,657	99.20	4,403	—13,193	—119,185	—143,573
Chicago River & Indiana	May	19	.....	.....	546,271	101,348	65,852	1,069	215,154	12,001	395,424	72.30	150,847	119,530	223,266	287,046
	5 mos.	19	.....	.....	2,989,957	345,547	322,200	4,488	1,219,477	58,506	1,950,218	65.20	1,039,739	841,192	1,346,628	1,410,784
Chicago, Rock Island & Pacific	May	7,633	6,456,852	1,976,248	9,188,670	1,258,742	2,515,044	235,356	4,023,292	279,804	8,262,431	89.90	926,239	385,309	20,785	914,187
	5 mos.	7,635	33,803,924	10,232,774	47,576,313	5,411,778	10,979,508	1,016,410	20,679,689	1,462,100	39,541,607	83.10	8,034,706	5,414,743	3,528,192	2,907,299
Chicago, Rock Island & Gulf	May	461	376,546	69,240	482,574	63,833	64,367	14,495	219,064	16,600	380,487	78.80	102,087	89,438	55,579	—35,761
	5 mos.	461	1,851,517	378,512	2,429,509	290,099	339,372	68,702	1,032,266	82,209	1,823,780	75.10	605,729	542,785	392,540	—62,233
Chicago, St. Paul, Minn. & Omaha	May	1,749	1,414,247	419,238	2,005,668	426,722	386,801	35,827	928,909	72,451	1,858,202	92.60	147,466	27,678	10,060	113,138
	5 mos.	1,749	7,824,760	2,455,731	11,136,034	1,284,286	2,249,259	176,267	5,121,977	368,288	9,234,476	82.90	1,901,558	1,276,788	1,014,935	1,036,751
Cincinnati, Indianapolis & Western	May	347	294,845	31,449	348,264	63,802	65,854	13,909	142,892	17,377	304,567	87.40	43,697	26,196	—1,528	23,816
	5 mos.	347	1,504,577	154,643	1,771,280	224,955	384,347	67,231	752,033	90,043	1,521,854	85.90	249,427	159,469	63,379	91,099
Colorado & Southern	May	1,099	738,810	145,590	986,593	188,230	268,224	18,001	394,349	44,534	920,105	93.30	66,488	3,651	—3,054	76,052
	5 mos.	1,099	4,028,543	674,321	5,114,295	590,343	1,351,031	67,841	2,066,125	218,772	4,329,714	84.70	784,581	470,617	442,496	179,078
Ft. Worth & Denver City	May	456	564,643	143,632	781,097	95,602	198,473	18,656	229,435	35,166	578,592	74.10	202,505	163,004	174,901	159,847
	5 mos.	456	2,972,901	732,819	3,941,586	362,061	911,290	69,622	1,237,214	176,848	2,762,243	70.10	1,179,343	977,808	1,059,396	793,422
Wichita Valley	May	271	101,907	20,369	130,542	28,801	8,308	40	40,564	2,266	78,188	59.90	52,354	44,904	27,990	22,926
	5 mos.	271	599,693	116,314	759,020	127,774	54,047	203	227,949	9,901	417,536	55.00	341,484	302,955	208,131	73,921
Columbus & Greenville	May	167	97,935	22,833	127,061	36,209	16,662	2,831	47,326	9,485	112,244	88.30	14,817	13,317	2,792	—1,405
	5 mos.	167	464,182	133,216	633,049	157,503	77,351	13,695	234,759	47,233	529,299	83.60	103,750	96,207	43,881	11,456
Delaware & Hudson	May	894	3,252,336	245,467	3,704,359	520,786	957,700	51,720	1,337,899	142,657	3,029,851	81.80	674,508	569,085	585,093	1,166,967
	5 mos.	894	16,079,708	1,369,799	18,436,878	2,437,382	5,193,058	228,323	7,410,586	710,423	16,076,386	87.20	2,360,492	1,843,002	1,965,831	1,354,685
Delaware, Lackawanna & Western	May	992	5,562,882	1,070,951	7,447,665	666,658	1,538,411	125,320	2,814,185	156,974	5,354,524	71.90	2,093,141	1,478,070	1,545,440	1,491,641
	5 mos.	992	26,563,515	5,253,323	35,789,393	3,081,064	7,885,567	600,887	14,867,777	797,553	27,488,969	76.80	8,300,424	5,621,596	5,940,097	3,443,929
Denver & Rio Grande Western	May	2,598	1,825,618	366,767	2,384,735	584,562	563,916	61,292	781,670	83,079	2,108,548	88.40	276,187	108,055	174,008	284,183
	5 mos.	2,598	9,161,049	1,775,083	11,926,686	1,669,736	3,253,423	258,404	4,226,438	422,598	9,973,524	83.60	1,953,162	1,112,332	1,425,335	674,945
Denver & Salt Lake	May	255	223,081	25,931	270,339	85,270	87,385	1,175	74,163	6,119	254,112	94.00	16,227	7,225	15,335	—13,107
	5 mos.	255	853,683	106,982	1,066,065	244,386	481,404	5,568	366,281	32,074	1,129,713	106.00	—63,648	—108,657	—69,260	—171,822
Detroit & Mackinac	May	375	146,465	20,342	182,213	44,286	40,286	2,076	59,996	5,650	151,911	83.40	30,302	15,737	20,131	11,317
	5 mos.	375	557,004	137,501	756,193	130,720	187,161	9,820	305,881	27,187	659,549	87.20	96,644	41,043	89,026	23,484
Detroit & Toledo Shore Line	May	61	222,829	.....	228,597	41,886	34,067	2,494	80,600	6,283	165,330	72.30	63,267	42,706	—27,809	90,890
	5 mos.	61	1,492,598	.....	1,514,279	173,818	166,207	14,639	507,645	38,468	900,777	11.50	613,502	496,587	74,222	417,995
Detroit Terminal	May	18	.....	.....	208,588	32,600	8,580	3	106,099	1,631	148,913	71.39	59,675	39,024	58,681	52,295
	5 mos.	18	.....	.....	1,034,883	120,356	58,217	8	540,498	8,381	727,460	70.29	307,423	203,195	282,227	176,868
Detroit, Toledo & Ironton	May	468	943,283	7,786	968,856	149,528	183,278	7,382	273,697	20,850	631,552	65.20	337,304	278,909	158,812	170,961
	5 mos.	468	5,128,571	40,851	5,243,291	575,380	797,159	37,017	1,476,328	127,422	3,008,718	57.40	2,234,573	2,058,248	1,411,262	643,679
Duluth & Iron Range	May	280	807,144	9,584	885,081	159,471	129,946	1,187	223,057	17,990	532,044	60.10	353,037	306,992	308,463	426,181
	5 mos.	280	1,470,450	76,111	1,704,113	415,231	682,689	5,210	784,936	106,456	1,996,787	117.20	—292,574	—412,279	—424,251	—328,127
Duluth, Missabe & Northern	May	305	2,082,352	10,078	2,241,242	270,152	187,349	3,206	374,559	21,265	857,229	38.20	1,384,013	1,251,203	1,246,387	1,113,482
	5 mos.	305	2,847,362	62,239	3,143,807	891,714	1,043,421	15,354	1,003,409	96,608	3,054,042	97.10	89,765	—468,315	—482,585	—556,435
Duluth, South Shore & Atlantic	May	591	415,501	86,313	545,253	119,270	77,037	6,971	210,322	11,655	430,600	79.00	114,653	75,633	46,174	103,710
	5 mos.	591	1,762,373	483,529	2,417,946	338,675	415,836	31,110	1,099,032	56,050	1,967,549	81.40	450,397	295,296	155,857	90,201
Duluth, Winnipeg & Pacific	May	178	147,163	8,218	155,269	59,448	26,670	3,824	66,716	8,387	165,463	106.60	—10,194	—19,370	—20,095	14,602
	5 mos.	178	916,035	99,853	1,043,769	157,712	165,174	15,871	410,291	45,990	798,498	76.50	245,271	192,330	195,304	130,065
Elgin, Joliet & Eastern	May	459	1,575,126	154	1,747,665	263,478	376,896	12,566	641,290	39,960	1,333,915	76.30	413,750	331,732	169,360	717,621
	5 mos.	459	9,161,837	332	10,149,095	938,500	2,382,387	63,029	3,602,167	200,139	7,185,351	70.80	2,963,744	2,553,827	1,599,856	2,750,453
El Paso & Southwestern	May	1,139	726,139	149,634	928,130	176,964	205,934	41,002	305,620	41,544	779,717	84.00	148,413	65,879	3,488	118,087
	5 mos.	1,139	3,961,860	909,945	5,133,910	920,518	1,105,573	189,189	1,484,570	208,946	3,955,088	77.00	1,178,822	765,580	569,904	868,738

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1924—CONTINUED

Name of road.		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures.	Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net operating income.	Net op. income 1923.
Erie Railroad	May	2,055	$6,905,173	$1,070,532	$8,686,046	$1,205,749	$2,370,407	$142,877	$3,397,263	$275,006	$7,439,010	85.60	$1,247,036	$893,954	$1,065,478	$2,160,662
	5 mos.	2,055	34,645,510	5,179,372	43,338,880	5,258,587	11,995,757	718,021	17,373,453	1,395,488	36,957,680	85.30	6,381,200	4,637,167	5,821,525	6,670,545
Chicago & Erie	May	269	1,046,897	58,248	1,201,076	148,464	141,144	22,456	376,906	34,804	723,910	60.30	477,166	424,440	171,935	145,558
	5 mos.	269	5,253,433	277,801	5,986,449	574,995	800,144	112,711	2,129,995	183,420	3,801,339	63.50	2,185,110	1,921,519	451,072	—258,490
New Jersey & New York	May	45	25,727	104,161	134,755	21,622	20,227	1,494	61,317	3,541	108,201	80.30	26,554	22,887	—2,930	—19,025
	5 mos.	45	120,949	493,614	639,577	91,431	102,312	5,904	329,914	18,630	548,162	85.70	91,415	72,896	—63,929	—83,762
N. Y., Susquehanna & Western	May	135	311,509	59,989	418,956	61,030	66,707	3,759	205,372	10,414	347,281	82.90	71,675	42,293	32,577	58,907
	5 mos.	135	1,403,555	290,662	1,927,105	263,140	455,464	17,886	1,057,133	54,144	1,847,688	95.90	79,417	—72,873	—131,826	76,140
Evansville, Ind. & Terre Haute	May	143	111,392	5,121	123,522	31,062	16,309	1,802	51,609	3,293	102,401	82.90	21,121	16,871	—1,065	—33,285
	5 mos.	140	666,235	34,691	730,179	141,546	79,489	9,428	301,010	16,850	533,108	73.00	197,071	173,326	70,667	—82,371
Florida East Coast	May	763	1,129,014	313,313	1,631,215	197,940	250,098	12,950	530,557	35,284	1,025,853	62.90	605,362	507,044	393,121	368,895
	5 mos.	763	5,511,111	3,160,605	9,850,867	1,131,226	1,325,029	96,950	3,078,387	170,474	5,889,346	59.80	3,961,521	3,458,873	2,934,920	2,976,937
Fort Smith & Western	May	249	114,147	18,052	141,002	30,478	25,351	5,537	48,512	7,600	115,632	82.00	25,370	19,426	2,539	—3,420
	5 mos.	249	534,359	96,420	677,915	151,270	134,771	26,527	262,194	38,975	607,981	89.70	69,934	39,706	—29,514	44,344
Galveston Wharf Co.	May	13	.....	.....	80,103	38,024	3,435	934	27,545	2,572	76,656	95.70	3,447	—13,553	—13,610	3,037
	5 mos.	13	.....	.....	483,487	200,975	20,935	4,256	141,414	13,899	402,390	83.20	81,097	—3,188	—3,183	63,980
Georgia Railroad	May	328	361,697	99,800	495,346	70,952	101,563	21,931	233,653	22,731	448,212	90.50	47,134	40,240	22,445	79,163
	5 mos.	328	1,827,879	477,425	2,480,558	272,939	472,428	110,270	1,093,845	108,905	2,043,717	82.40	436,841	401,716	349,751	391,515
Georgia & Florida	May	406	105,617	18,257	133,456	16,527	18,556	8,685	51,932	8,296	104,231	78.10	29,225	22,719	12,481	10,850
	5 mos.	406	591,906	92,427	728,977	88,430	103,001	41,383	280,538	40,512	554,993	76.10	173,984	141,327	79,758	78,670
Grand Trunk Western	May	347	1,265,768	159,693	1,517,667	282,226	413,455	51,658	594,393	52,711	1,401,988	92.40	115,679	36,322	—108,327	174,520
	5 mos.	347	6,671,218	831,279	7,946,199	832,189	2,174,276	215,822	3,189,316	252,978	6,699,688	84.30	1,246,511	884,838	14,321	770,732
Atlantic & St. Lawrence	May	166	102,041	33,618	151,205	110,366	35,355	5,578	102,220	7,522	263,339	174.10	—112,134	—127,284	—183,150	—99,425
	5 mos.	166	886,660	168,182	1,130,064	266,892	232,161	29,409	685,181	49,752	1,272,923	112.60	—142,859	—218,646	—557,068	—705,139
Chic., Detroit & Canada Gr. Tr. Jct.	May	59	191,692	7,843	232,210	42,171	10,772	6,498	80,539	3,333	143,299	61.70	88,911	74,948	46,237	176,776
	5 mos.	59	1,104,007	42,127	1,336,697	95,874	61,751	28,672	441,238	17,108	644,609	48.20	692,088	644,222	509,016	616,581
Detroit, Gr. Haven & Milwaukee	May	189	517,890	39,003	604,225	136,029	45,243	15,709	239,805	16,067	452,761	74.90	151,464	146,061	54,763	95,875
	5 mos.	189	2,376,223	202,174	2,803,034	402,511	261,943	67,407	1,282,814	77,607	2,093,086	74.70	709,948	684,267	242,699	143,125
Great Northern	May	8,251	6,406,703	973,363	8,225,029	1,651,890	1,220,094	227,578	2,086,873	212,298	6,417,580	78.00	1,807,449	895,888	1,062,075	882,136
	5 mos.	8,251	27,658,856	5,008,820	36,722,047	5,344,668	6,910,107	840,969	15,419,834	1,095,894	29,770,269	81.10	6,951,778	3,173,580	3,887,201	2,476,642
Green Bay & Western	May	234	97,795	9,060	113,402	22,015	24,203	3,436	42,539	2,464	94,642	83.40	18,760	11,260	7,360	9,826
	5 mos.	234	498,173	85,075	619,100	93,992	112,366	16,378	232,752	12,497	467,950	75.50	151,150	113,626	88,426	58,272
Gulf Coast Lines	May	922	1,031,168	169,996	1,288,755	182,224	154,969	33,287	331,001	38,376	737,833	57.25	550,922	496,138	436,276	214,922
	5 mos.	922	4,882,273	882,372	6,110,424	890,588	743,897	149,102	1,569,043	185,218	3,531,011	57.79	2,579,414	2,307,113	1,943,489	1,158,452
Gulf & Ship Island	May	307	224,138	38,191	301,632	52,834	39,587	8,140	78,215	13,587	201,889	66.90	99,743	71,818	70,193	34,320
	5 mos.	307	1,148,975	183,633	1,503,398	240,914	198,712	39,701	441,395	69,161	1,040,870	69.20	462,528	329,628	280,922	220,535
Gulf, Mobile & Northern	May	465	439,876	36,174	495,202	76,889	75,121	21,850	152,585	22,380	348,685	70.41	146,517	118,232	108,377	75,346
	5 mos.	465	2,221,117	199,625	2,521,898	388,711	377,628	110,864	811,652	98,528	1,784,731	70.77	737,167	592,848	518,450	417,248
Hocking Valley	May	348	1,279,869	71,617	1,509,519	164,128	429,149	13,541	451,638	34,995	1,093,424	72.40	416,095	323,079	269,461	465,523
	5 mos.	348	5,752,893	385,520	6,602,808	670,074	1,936,988	68,272	2,108,653	179,645	4,963,242	75.20	1,639,566	1,174,282	1,361,465	1,173,278
Illinois Central	May	4,846	9,126,207	1,930,160	12,257,297	1,657,517	3,101,945	199,373	4,622,067	328,150	9,964,620	81.30	2,292,677	1,483,606	1,646,607	1,799,363
	5 mos.	4,847	48,234,972	10,854,624	63,853,361	7,749,298	14,298,377	991,599	24,458,093	1,597,115	49,283,748	77.20	14,569,613	10,235,885	10,961,513	11,309,150
Yazoo & Mississippi Valley	May	1,380	1,339,689	281,372	1,724,738	272,154	311,417	24,367	617,845	46,764	1,274,851	73.90	449,887	334,389	326,565	—82,888
	5 mos.	1,380	6,661,830	1,541,909	8,668,730	1,294,156	1,509,866	116,757	3,350,423	218,568	6,488,555	74.90	2,180,175	1,602,992	1,536,418	212,611
Illinois Central Combined Report	May	6,226	10,465,896	2,211,532	13,982,035	1,929,671	3,413,362	223,740	5,239,912	374,914	11,239,471	80.40	2,742,564	1,817,995	1,973,172	1,716,475
	5 mos.	6,227	54,896,802	12,396,533	72,522,091	9,043,454	15,808,243	1,108,356	27,808,516	1,815,683	55,772,303	76.90	16,749,788	11,838,877	12,497,931	11,521,761
International & Great Northern	May	1,159	904,203	218,508	1,243,607	257,280	250,525	37,297	493,615	47,776	1,043,289	83.89	200,318	165,357	110,631	100,234
	5 mos.	1,159	4,789,820	1,019,880	6,508,582	1,278,487	1,248,862	177,507	2,621,085	247,195	5,486,674	84.30	1,021,908	847,243	525,967	445,888
Kansas City, Mexico & Orient	May	272	153,718	8,475	169,661	28,363	39,608	4,328	77,839	5,341	155,434	91.60	14,227	7,815	—5,141	12,508
	5 mos.	272	692,333	36,230	761,905	157,201	188,651	24,009	352,397	27,444	749,657	98.40	12,248	—16,693	—83,230	—50,688
Kans. City, Mex. & Orient of Tex.	May	465	172,567	9,488	188,078	37,634	38,730	5,900	74,365	5,445	162,074	86.20	26,004	21,976	7,245	—45,108
	5 mos.	465	738,769	52,525	824,596	179,964	175,411	26,692	353,426	27,659	762,961	92.50	61,635	41,567	—24,757	—207,251
Kansas City Southern	May	767	1,185,519	164,599	1,505,735	256,885	303,401	44,524	520,800	74,634	1,198,364	79.60	307,371	223,446	162,226	295,237
	5 mos.	767	6,107,855	791,118	7,555,702	1,145,585	1,429,996	203,080	2,591,774	374,518	5,739,677	76.00	1,816,025	1,358,749	1,161,179	1,369,938
Texarkana & Ft. Smith	May	81	207,966	13,972	238,200	28,350	36,590	4,790	62,979	9,945	145,095	60.90	93,105	77,568	49,197	78,408
	5 mos.	81	1,045,203	70,959	1,208,585	98,243	119,084	23,864	314,569	49,044	613,095	50.70	595,490	518,122	400,256	340,353
Kansas, Oklahoma & Gulf	May	314	132,751	8,713	147,072	43,572	36,848	7,383	58,456	11,201	157,438	107.00	—10,366	—20,791	—24,579	1,602
	5 mos.	314	788,724	51,374	870,537	203,099	157,474	41,720	343,512	60,955	806,849	92.70	63,688	11,433	—28,689	100,432
Lake Superior & Ishpeming	May	162	168,773	3,773	198,359	42,570	8,504	500	46,950	5,621	104,145	52.50	94,214	64,799	61,206	115,739
	5 mos.	162	453,744	29,879	527,796	157,053	121,736	2,617	195,285	27,411	504,102	95.50	23,694	—46,715	—62,416	—69,223

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1924—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of—Way and structures.	Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net operating income.	Net op. income 1923.
Lake Terminal R. R.	May	13	.....	.....	$97,042	$19,846	$15,678	.....	$57,885	$1,966	$95,375	98.30	$1,667	—$4,738	—$7,283	$17,653
	5 mos.	13	.....	.....	420,641	78,839	87,144	.....	271,553	9,183	446,719	106.20	—26,078	—58,101	—70,113	21,044
Lehigh & Hudson River	May	96	$254,730	$2,373	268,542	28,619	43,103	$1,954	99,380	9,629	182,685	68.00	85,857	71,432	49,276	71,897
	5 mos.	96	1,244,801	14,368	1,314,346	141,788	227,212	8,398	491,238	55,442	924,078	70.30	390,268	320,441	199,570	266,442
Lehigh & New England	May	219	447,852	1,498	458,148	56,324	97,393	7,432	132,951	21,393	315,493	68.90	142,655	120,337	126,748	204,168
	5 mos.	219	1,978,336	8,554	2,030,402	267,035	613,278	30,316	680,873	89,983	1,681,476	82.80	348,926	282,554	329,917	573,602
Lehigh Valley	May	1,374	5,376,137	587,235	6,450,809	676,517	1,699,302	116,787	2,603,672	134,937	5,260,829	81.80	1,169,980	940,262	901,982	710,988
	5 mos.	1,374	26,167,945	2,761,690	31,076,638	3,101,313	7,945,646	546,671	13,107,351	678,732	25,500,615	82.10	5,576,023	4,418,840	4,100,357	—380,303
Los Angeles & Salt Lake	May	1,209	1,357,429	522,703	2,067,883	455,841	425,026	71,963	654,135	61,287	1,736,783	84.00	331,100	201,847	122,875	413,976
	5 mos.	1,209	7,097,949	2,374,527	10,346,600	1,968,006	2,129,228	307,308	3,325,012	302,499	8,321,706	80.40	2,024,894	1,378,024	1,029,447	981,966
Louisiana & Arkansas	May	302	320,650	33,787	362,836	67,362	72,869	8,853	104,097	12,051	264,283	72.80	98,553	80,216	64,185	88,616
	5 mos.	302	1,415,774	171,360	1,631,393	274,631	356,568	43,640	477,077	57,368	1,207,358	74.00	424,035	312,300	253,296	468,663
Louisiana Ry. & Nav. Co.	May	337	276,640	22,234	313,235	76,166	59,854	13,145	132,566	11,459	292,779	93.50	20,456	2,456	—26,998	—7,342
	5 mos.	337	1,313,486	120,729	1,525,388	394,293	235,170	54,724	674,043	56,446	1,410,334	92.50	115,054	25,009	—103,247	40,207
Louisiana Ry. & Nav. Co. of Tex.	May	206	91,922	9,666	107,872	20,810	13,911	3,238	47,527	4,881	90,345	83.70	17,527	13,526	—1,925	—15,278
	5 mos.	206	426,811	58,816	525,388	102,652	86,077	16,968	264,102	24,410	494,185	94.10	31,203	11,197	—79,622	From April —34,715
Louisville & Nashville	May	5,042	8,097,713	1,990,756	10,802,273	1,732,999	2,590,980	233,262	4,127,552	268,229	8,987,061	83.20	1,815,212	1,439,529	1,369,469	2,113,244
	5 mos.	5,042	42,250,093	9,826,739	55,654,884	8,066,000	14,298,570	1,174,889	21,742,390	1,310,625	46,774,583	84.00	8,880,301	6,801,483	6,934,523	9,313,081
Louisville, Henderson & St. Louis	May	199	165,311	70,584	259,435	57,592	36,386	7,569	115,371	9,306	226,224	87.20	33,211	29,610	26,242	87,680
	5 mos.	199	1,061,793	303,249	1,457,987	319,349	214,013	34,525	516,144	47,695	1,131,726	77.60	326,261	270,623	210,174	280,842
Maine Central	May	1,207	1,161,297	323,107	1,641,158	293,124	326,207	17,806	663,616	48,054	1,348,654	82.20	292,504	190,203	198,252	135,528
	5 mos.	1,207	6,256,101	1,737,287	8,654,864	1,336,740	1,783,450	67,907	3,722,765	249,189	7,159,397	82.70	1,495,467	983,805	938,195	215,632
Midland Valley	May	365	324,711	51,244	388,497	85,962	60,369	5,850	107,588	16,582	273,091	70.30	115,406	96,261	72,961	89,750
	5 mos.	365	1,569,246	289,010	1,924,506	332,113	254,735	30,044	559,239	85,491	1,248,957	64.90	675,549	590,466	520,863	517,758
Minneapolis & St. Louis	May	1,649	892,517	98,978	1,061,541	456,151	337,703	28,959	532,626	45,376	1,400,616	131.90	—339,075	—401,495	—446,313	15,587
	5 mos.	1,649	4,924,451	656,132	5,933,904	1,258,053	1,561,019	136,990	2,851,085	221,995	6,026,854	101.60	—92,950	—424,196	—697,474	464,238
Minneapolis, St. P. & S. S. Marie	May	4,402	2,726,985	462,320	3,528,243	719,659	724,249	66,603	1,457,377	110,004	3,102,080	87.90	426,163	189,383	140,938	711,088
	5 mos.	4,402	13,100,161	2,618,115	17,227,284	2,698,793	3,478,755	313,439	7,753,773	566,919	14,882,355	86.40	2,344,929	1,178,160	929,845	1,995,466
Mississippi Central	May	257	135,470	13,509	153,663	27,670	24,001	6,050	41,594	7,934	107,249	69.80	46,414	38,792	43,564	5,501
	5 mos.	257	662,834	75,164	763,389	140,072	119,995	29,720	221,468	39,433	550,674	72.10	212,715	178,569	202,476	142,665
Missouri & North Arkansas	May	364	101,237	17,562	127,944	35,762	21,784	5,026	51,073	7,013	120,658	94.30	7,286	4,154	—2,955	5,282
	5 mos.	364	496,749	93,540	633,813	134,722	124,164	22,174	266,661	36,508	584,229	92.20	49,584	33,087	—186	10,353
Missouri-Kansas-Texas	May	1,799	2,061,841	452,254	2,711,171	301,313	574,788	52,696	740,958	89,145	1,772,399	65.40	938,772	746,295	803,994	805,199
	5 mos.	1,810	9,818,262	2,214,668	13,115,566	1,309,302	3,162,355	256,032	3,771,435	459,241	9,019,889	68.80	4,095,617	3,200,845	3,515,190	3,095,923
Missouri-Kansas-Texas of Texas	May	1,389	977,222	403,876	1,521,126	259,076	306,816	41,983	588,445	68,199	1,274,942	83.80	246,184	196,297	56,311	113,290
	5 mos.	1,389	4,985,582	1,991,844	7,745,941	1,197,381	1,200,892	203,824	3,167,229	332,830	6,124,631	79.10	1,621,310	1,370,403	537,671	—280,298
Missouri Pacific	May	7,361	7,330,600	1,434,585	9,701,131	1,614,434	2,221,922	224,792	3,533,052	310,473	7,974,161	82.20	1,726,970	1,349,401	1,099,758	848,150
	5 mos.	7,362	36,429,504	7,124,067	47,808,341	6,929,387	10,696,823	978,519	18,782,530	1,523,088	39,227,161	82.10	8,581,180	6,694,291	5,310,136	2,769,848
Mobile & Ohio	May	1,165	1,494,528	158,323	1,742 642	240,715	277,907	39,997	597,851	47,727	1,204,464	69.10	528,178	446,841	385,614	264,316
	5 mos.	1,165	7,275,950	784,342	8,528,502	1,167,615	1,503,949	235,148	2,984,918	235,631	6,128,209	71.90	2,400,293	1,966,731	1,648,984	1,444,594
Monongahela	May	106	300,066	27,005	331,910	55,000	85,793	1,083	92,931	11,109	245,694	74.00	86,216	75,563	30,731	135,322
	5 mos.	106	1,839,659	154,577	2,016,223	275,000	428,965	5,361	613,649	48,916	1,375,110	68.20	641,113	588,109	255,674	359,602
Monongahela Connecting	May	7	.....	.....	149,847	19,586	47,948	375	77,430	4,500	149,839	100.00	8	—5,408	—11,876	38,862
	5 mos.	7	.....	.....	969,184	119,084	227,528	1,905	516,945	22,220	887,682	91.60	81,502	54,922	4,244	74,586
Montour	May	57	122,439	987	125,311	25,935	48,477	1,047	31,788	7,365	114,612	91.50	10,699	4,610	36,095	115,984
	5 mos.	57	566,585	5,342	579,642	119,646	230,803	5,042	181,899	36,468	573,858	99.00	5,784	—19,008	139,856	394,798
Nashville, Chattanooga & St. Louis	May	1,258	1,406,642	400,731	1,946,458	379,247	449,302	71,915	758,151	72,638	1,729,218	88.80	217,240	157,035	129,012	290,627
	5 mos.	1,258	7,256,152	2,020,361	10,021,102	1,470,409	2,401,992	387,331	3,887,094	343,736	8,505,183	84.90	1,515,919	1,214,180	1,153,748	1,669,460
Nevada Northern	May	165	70,472	10,183	85,099	14,519	7,290	850	15,983	4,329	42,971	50.50	42,128	35,408	35,512	44,978
	5 mos.	165	359,406	46,688	431,558	64,184	40,147	4,603	86,352	22,623	217,909	50.50	213,649	179,235	178,123	143,265
Newburgh & South Shore	May	7	.....	.....	161,264	36,908	56,638	.....	63,621	4,206	162,909	101.00	—1,645	—14,921	—9,453	19,538
	5 mos.	7	.....	.....	850,469	105,077	277,335	.....	353,980	19,392	759,602	89.30	90,867	23,362	55,765	47,968
New Orleans Great Northern	May	274	222,554	29,325	261,070	53,547	44,523	5,531	75,614	10,395	190,158	72.80	70,912	53,013	41,257	58,188
	5 mos.	274	1,057,280	144,378	1 247,605	181,664	218,329	27,426	383,762	55,550	869,279	69.70	378,326	290,393	233,361	308,591
New York Central	May	6,889	18,399,636	7,714,988	30,124,231	3,818,702	5,925,706	346,491	11,015,870	867,668	22,247,299	73.90	7,876,932	5,828,042	5,598,334	8,438,513
	5 mos.	6,889	96,915,137	36,914,756	152,975,585	17,467,253	33,016,192	1,760,380	58,756,511	4,501,947	117,262,159	76.70	35,713,426	25,856,633	24,805,342	30,786,674
Cincinnati Northern	May	244	318,933	10,419	337,719	59,433	61,927	5,767	125,039	8,583	260,856	77.20	76,863	63,575	28,402	54,245
	5 mos.	244	1,914,269	56,111	2,007,382	267,116	346,523	27,545	722,092	44,147	1,407,543	70.10	599,839	503,710	273,954	403,406
Cleve., Cin., Chic. & St. Louis	May	2,410	4,852,157	1,379,649	6,875,717	944,361	1,508,208	114,701	2,603,349	185,979	5,349,778	77.80	1,525,939	1,136,873	1,057,188	1,827,796
	5 mos.	2,408	26,315,132	6,652,136	35,950,025	4,037,559	7,944,679	568,621	14,191,716	987,676	27,842,918	77.40	8,107,107	6,166,987	5,248,283	7,628,993
Indiana Harbor Belt	May	119	.....	.....	882,603	132,087	136,216	4,723	380,632	24,092	676,611	76.70	205,992	180,764	60,191	173,686
	5 mos.	119	.....	.....	4,548,492	506,836	603,433	23,399	2,163,600	119,890	3,413,311	75.00	1,135,181	996,958	386,085	619,252
Michigan Central	May	1,862	4,603,611	1,655,276	6,951,252	966,404	1,482,390	100,348	2,448,905	150,964	5,222,734	75.10	1,728,518	1,316,695	1,254,444	2,306,446
	5 mos.	1,862	25,746,821	8,036,204	37,378,415	4,175,253	7,609,225	499,032	13,347,130	809,559	26,782,159	71.70	10,596,256	8,407,840	7,856,206	9,409,272
Pittsburgh & Lake Erie	May	234	2,042,546	251,124	2,401,126	351,566	715,124	27,122	817,867	68,643	1,981,744	82.50	419,382	274,782	509,862	1,703,786
	5 mos.	234	12,425,459	1,271,770	14,242,406	1,670,719	4,280,176	129,270	4,676,063	360,469	11,121,952	78.10	3,120,454	2,288,023	3,906,635	7,024,331
New York, Chicago & St. Louis	May	1,695	4,089,875	165,374	4,441,903	698,026	882,544	121,860	1,636,200	156,409	3,499,651	78.80	942,252	712,545	610,221	1,275,287
	5 mos.	1,695	21,353,393	771,654	22,963,405	2,972,073	4,419,236	588,344	8,841,024	783,752	17,624,260	76.70	5,339,145	4,166,013	3,454,015	4,728,856

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1924—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures.	Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net operating income.	Net op. income 1923.
New York, New Haven & aHrtford	May	1,987	$5,355,994	$4,047,679	$10,558,778	$1,492,665	$2,310,851	$64,138	$3,964,332	$284,767	$8,254,267	78.20	$2,304,511	$1,901,217	$1,427,969	$1,484,965
	5 mos.	1,995	26,240,160	19,719,242	51,496,070	5,884,631	11,827,190	302,243	20,296,701	1,421,471	40,510,026	78.10	11,386,050	9,334,013	7,417,503	2,310,406
Central New England	May	295	631,187	11,951	664,770	114,349	129,923	5,184	218,797	11,420	479,673	72.20	185,097	159,397	161,664	87,829
	5 mos.	295	3,164,552	65,318	3,339,360	498,062	625,407	24,850	1,149,639	56,586	2,354,544	70.50	984,816	856,209	691,130	—57,095
New York Connecting	May	20	171,465	.....	225,288	10,805	13,151	.....	44,188	1,110	69,254	30.70	156,034	115,284	83,443	263,601
	5 mos.	20	919,626	.....	1,175,391	40,899	71,834	.....	236,905	6,668	356,306	30.30	819,085	634,235	456,491	780,819
New York, Ontario & Western	May	569	752,173	163,773	1,079,760	154,502	187,001	15,710	491,477	32,041	881,246	81.60	198,514	150,452	102,891	126,191
	5 mos.	569	3,520,644	571,024	4,849,648	612,375	1,009,945	77,328	2,450,714	180,918	4,336,874	89.40	512,774	272,269	114,717	—222,907
Norfolk & Western	May	2,240	5,792,944	723,508	6,868,748	1,193,227	1,635,183	85,662	2,242,241	165,339	5,329,164	77.60	1,539,584	862,174	937,642	1,750,983
	5 mos.	2,240	33,300,030	3,633,941	38,538,913	6,048,357	9,892,774	421,979	12,640,775	830,525	29,893,136	77.60	8,645,777	5,566,519	6,233,257	7,303,384
Norfolk Southern	May	931	644,982	95,739	787,958	105,089	122,127	24,236	318,315	29,396	599,795	76.10	188,163	144,106	102,954	103,995
	5 mos.	931	3,376,247	484,839	4,098,150	540,394	606,669	123,549	1,607,410	145,681	3,026,245	73.80	1,071,905	855,051	623,380	479,132
Northern Pacific	May	6,669	5,147,513	1,033,126	6,875,626	1,532,763	1,820,849	200,552	2,605,238	215,497	6,401,122	93.10	474,504	—199,503	171,136	193,164
	5 mos.	6,669	26,887,941	5,135,435	35,476,034	5,207,904	8,302,973	805,078	13,881,300	1,141,531	29,472,513	83.10	6,003,521	2,611,017	4,500,882	3,229,703
Northwestern Pacific	May	496	313,538	207,977	584,419	89,944	82,677	9,523	218,237	17,462	417,366	71.40	167,053	121,713	114,585	134,230
	5 mos.	496	1,443,641	896,535	2,616,113	546,932	479,859	31,107	1,078,309	88,736	2,223,289	85.00	392,824	165,213	127,489	196,421
Pennsylvania R. R	May	10,508	35,544,088	11,841,509	52,290,448	5,958,519	12,692,672	661,085	20,381,269	1,420,969	41,897,462	80.10	10,392,986	7,339,695	5,757,151	8,604,569
	5 mos.	10,508	181,576,153	59,636,576	264,284,591	25,521,538	67,223,726	3,188,787	107,132,152	7,154,237	214,020,128	81.00	50,264,463	39,052,786	30,968,187	33,507,596
Baltimore, Chesapeake & Atlantic	May	125	84,139	27,430	116,422	11,314	44,934	2,333	69,929	3,689	132,199	113.60	—15,777	—20,914	—20,364	—39,419
	5 mos.	95	342,536	114,836	477,185	52,810	149,458	8,051	348,094	18,054	576,467	120.80	—99,282	—105,785	—109,062	—172,257
Long Island	May	397	921,102	1,862,178	3,013,343	393,677	522,042	22,105	1,339,785	65,617	2,353,962	78.20	659,381	471,603	246,618	325,718
	5 mos.	397	4,261,144	7,585,342	12,900,305	1,740,150	2,451,197	100,802	6,261,313	324,709	10,939,359	84.80	1,960,946	1,515,842	930,276	784,431
West Jersey & Seashore	May	360	335,738	537,417	935,992	168,679	180,106	15,719	450,691	25,917	841,556	89.90	94,436	9,690	—16,245	14,828
	5 mos.	360	1,660,714	2,389,568	4,408,707	693,644	932,835	61,286	2,319,030	119,095	4,154,249	94.20	254,458	134,943	12,576	150,947
Peoria & Pekin Union	May	19	26,091	2,306	136,346	30,400	14,056	925	63,391	7,151	115,923	85.00	20,423	7,923	32,750	36,375
	5 mos.	19	128,585	12,799	772,943	82,520	76,517	3,628	360,694	38,796	562,155	72.70	210,788	148,288	260,023	252,820
Pere Marquette	May	2,292	2,686,309	376,038	3,341,651	545,716	758,937	52,744	1,274,359	100,139	2,707,109	81.00	634,542	462,308	321,049	587,856
	5 mos.	2,292	13,622,639	2,027,011	17,184,251	2,106,533	3,778,772	262,942	6,882,879	523,373	13,528,685	78.70	3,655,666	2,860,232	2,192,510	2,649,002
Pittsburgh & Shawmut	May	102	73,760	4,999	81,216	19,556	32,143	1,831	27,204	7,298	88,032	108.40	—6,816	—6,957	4,069	23,059
	5 mos.	102	385,467	31,567	427,151	94,654	192,584	7,401	154,099	35,999	484,737	113.50	—57,586	—58,870	19,797	176,239
Pittsburgh & West Virginia	May	92	297,309	9,830	344,433	67,315	98,329	4,894	72,411	21,311	281,375	81.70	63,058	26,762	92,178	134,114
	5 mos.	92	1,354,263	45,644	1,573,734	174,163	464,249	22,979	362,968	78,636	1,177,906	74.80	395,828	208,615	553,619	598,904
Pittsburgh, Shawmut & Northern	May	210	101,684	4,740	113,061	28,749	27,118	1,823	43,436	5,754	106,880	94.50	6,181	3,523	—2,059	6,291
	5 mos.	210	492,030	32,878	548,780	111,269	166,234	8,257	244,610	30,358	560,728	102.20	—11,948	—25,565	—47,735	89,626
Quincy, Omaha & Kansas City	May	250	48,023	19,227	75,399	39,431	12,700	1,232	38,331	2,453	93,923	124.60	—18,524	—21,842	—24,287	—25,967
	5 mos.	250	281,992	115,563	438,343	141,718	88,206	4,605	222,471	13,670	470,205	107.30	—31,862	—51,471	—65,434	—115,236
Reading Company	May	1,149	6,869,282	857,979	8,094,273	1,003,560	1,903,701	78,730	2,928,564	228,581	6,152,843	76.00	1,941,430	1,555,260	1,655,117	3,788,599
	5 mos.	1,149	33,213,659	4,207,882	39,151,743	4,510,622	9,872,568	368,755	14,968,297	1,047,115	30,811,893	78.70	8,339,850	6,407,500	7,157,714	15,391,979
Atlantic City	May	168	124,249	201,679	341,318	92,666	30,057	14,518	198,154	4,167	339,623	99.50	1,695	—18,340	—41,765	—36,660
	5 mos.	169	579,624	732,507	1,384,879	525,321	155,894	42,167	910,290	20,845	1,654,878	119.50	—269,999	—370,059	—482,336	—369,455
Perkiomen	May	41	92,724	6,409	103,056	8,269	6,360	106	47,799	763	63,323	61.40	39,733	35,297	29,243	22,787
	5 mos.	41	431,167	27,918	478,227	38,052	25,706	538	219,754	3,981	288,209	60.30	190,018	171,988	148,603	110,851
Port Reading	May	21	144,203	.....	182,210	22,055	10,335	229	72,636	1,275	106,530	58.50	75,680	59,236	2,171	46,022
	5 mos.	21	642,825	.....	819,882	117,384	32,288	1,145	386,387	11,959	549,163	67.00	270,719	201,281	—22,176	264,001
Richm'd, Fredericksburg & Potomac	May	117	597,796	297,080	1,070,339	157,847	149,994	8,533	353,055	31,704	727,115	67.90	343,224	288,202	216,603	270,017
	5 mos.	117	2,480,681	1,880,692	5,240,245	613,192	764,668	45,572	1,735,128	166,849	3,453,870	65.90	1,786,375	1,499,137	1,173,168	1,299,226
Rutland	May	413	332,005	104,041	553,961	114,124	93,567	9,377	223,266	13,983	456,036	82.30	97,925	69,852	72,587	72,869
	5 mos.	413	1,587,686	584,955	2,708,611	463,126	520,320	43,332	1,161,841	67,024	2,263,292	83.60	445,319	308,452	337,843	347,952
St. Louis-San Francisco	May	4,747	4,721,946	1,415,799	6,644,239	941,605	1,478,322	100,531	2,371,568	195,521	5,065,750	76.20	1,578,489	1,296,451	1,332,403	1,636,086
	5 mos.	4,747	23,616,659	7,220,396	33,353,204	4,040,751	6,889,251	476,005	12,052,409	1,008,436	24,357,650	73.00	8,995,554	7,312,284	7,402,736	7,765,159
Ft. Worth & Rio Grande	May	235	96,726	28,805	138,718	24,667	28,903	4,169	65,455	6,088	129,256	93.20	9,462	5,413	—6,538	—32,938
	5 mos.	235	422,174	126,836	609,024	99,436	118,405	20,718	290,518	29,533	558,400	91.70	50,624	31,195	—14,436	—112,498
St. Louis, San Francisco & Texas	May	134	121,169	12,119	138,758	20,232	27,676	4,915	53,486	6,653	112,951	81.40	25,807	23,603	429	—24,025
	5 mos.	134	579,328	66,264	673,399	95,964	123,909	25,087	265,876	32,449	543,121	80.70	130,278	119,506	11,594	—97,454
St. Louis Southwestern	May	969	1,124,850	138,267	1,338,267	204,494	295,369	49,290	353,857	56,653	974,961	72.90	363,306	307,015	241,210	486,333
	5 mos.	969	6,324,643	739,920	7,459,267	966,119	1,705,311	238,252	1,986,774	295,973	5,262,548	70.60	2,196,719	1,890,552	1,515,514	2,607,240
St. Louis Southwestern of Texas	May	807	429,308	85,500	561,016	142,505	163,385	20,801	235,501	29,235	596,031	106.20	—35,015	—60,748	—14,121	—133,236
	5 mos.	807	2,346,625	442,426	3,046,743	704,216	915,929	107,971	1,296,950	152,039	3,199,591	105.00	—152,848	—281,670	—75,841	—869,464
San Antonio & Aransas Pass	May	739	479,042	61,612	577,412	131,193	134,190	11,272	226,249	21,000	521,625	90.30	55,787	38,291	18,188	—3,780
	5 mos.	739	2,100,386	335,042	2,605,359	593,685	612,841	57,075	1,057,608	108,917	2,419,140	92.90	186,219	103,108	49,080	—225,921
San Antonio, Uvalde & Gulf	May	317	143,296	18,404	168,052	24,545	16,477	4,344	68,349	6,430	120,145	71.50	47,907	44,588	24,468	54,969
	5 mos.	317	509,614	98,409	661,343	123,592	76,702	21,915	275,978	30,735	528,922	80.00	132,421	115,392	42,194	19,139
Seaboard Air Line	May	3,570	3,237,712	653,499	4,325,337	521,909	819,121	141,257	1,690,850	171,448	3,368,504	77.90	956,833	766,124	702,056	629,540
	5 mos.	3,571	16,898,717	4,368,313	23,689,108	3,155,225	4,117,254	719,725	9,021,217	852,273	18,111,869	76.50	5,577,239	4,623,321	4,120,351	2,875,170
Southern Ry.	May	6,849	8,216,724	2,539,939	11,695,948	1,645,055	2,133,195	227,083	4,283,548	329,555	8,692,567	74.30	3,003,381	2,412,386	2,266,355	2,419,670
	5 mos.	6,849	41,436,240	12,513,405	58,609,275	8,149,358	10,593,517	1,133,871	22,010,579	1,592,773	43,875,276	74.90	14,733,999	11,803,305	10,698,387	11,178,034
Alabama Great Southern	May	318	613,869	167,499	831,324	114,523	175,153	21,128	269,051	23,721	610,094	73.40	221,230	172,792	184,295	247,408
	5 mos.	318	3,069,397	793,941	4,111,053	588,608	920,983	102,859	1,355,748	119,123	3,119,499	75.90	991,554	809,744	889,478	1,180,954

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1924—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Maintenance of: Way and structures.	Equipment.	Operating expenses: Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net operating income.	Net op. income 1923.
Cin., New Orleans & Tex. Pacific	May	338	$1,449,129	$331,928	$1,878,966	$289,162	$373,369	$41,261	$568,332	$49,117	$1,334,576	71.00	$544,420	$471,165	$428,680	$505,003
	5 mos.	338	6,997,217	1,772,198	9,255,842	1,384,505	1,939,394	195,252	2,782,205	231,812	6,597,802	71.30	2,658,040	2,302,223	2,185,044	2,314,317
Georgia Southern & Florida	May	401	273,587	103,580	407,797	69,822	51,468	10,576	152,094	10,540	297,218	72.90	110,579	92,151	42,639	47,095
	5 mos.	401	1,322,773	560,482	2,042,396	355,441	279,916	50,125	794,947	54,441	1,551,703	76.00	490,687	396,868	184,469	215,350
New Orleans & Northeastern	May	207	331,311	82,975	453,489	71,333	87,220	16,467	145,360	15,904	340,064	75.00	113,425	76,039	82,204	101,254
	5 mos.	207	1,800,538	404,503	2,378,039	351,393	448,927	60,246	737,922	76,436	1,693,701	71.20	684,338	493,282	483,539	483,313
Northern Alabama	May	110	113,157	12,510	128,658	25,590	6,009	2,415	46,610	3,054	83,673	65.00	44,985	38,945	5,875	32,569
	5 mos.	110	580,322	67,900	663,965	96,637	33,114	12,443	219,423	15,835	377,452	56.80	286,513	251,325	114,074	146,366
Southern Pacific	May	7,162	9,819,287	3,405,863	14,876,055	2,093,688	2,286,985	293,482	5,250,497	512,098	10,689,338	71.90	4,186,717	2,926,653	2,771,042	3,627,487
	5 mos.	7,155	49,530,421	17,538,294	74,311,910	11,158,255	13,433,185	1,439,936	26,099,592	2,515,521	55,844,739	74.66	18,967,171	12,818,151	12,200,139	13,841,843
Arizona Eastern	May	382	231,850	22,005	269,414	33,961	36,511	3,295	78,648	20,292	173,652	64.50	95,762	68,800	66,303	102,138
	5 mos.	382	1,203,378	136,235	1,414,163	248,952	210,203	16,825	473,484	103,551	1,058,644	74.90	355,519	220,622	206,603	414,967
Atlantic Steamship Lines	May	...	866,794	57,219	978,863	17,918	230,025	23,503	686,197	34,018	991,461	101.30	—12,598	—24,776	—24,776	200,279
	5 mos.	...	4,365,439	252,346	4,909,791	99,774	957,767	106,453	3,447,552	160,355	4,771,901	97.20	137,890	78,170	76,743	1,041,583
Galveston, Harrisb. & San Antonio	May	1,379	1,611,467	390,992	2,115,234	369,450	368,652	41,923	737,141	88,773	1,622,792	76.70	492,442	423,801	363,718	46,695
	5 mos.	1,379	7,586,692	2,105,815	10,294,953	2,076,471	2,101,044	224,866	3,695,334	434,019	8,590,073	83.40	1,704,880	1,370,649	1,103,453	561,923
Houston & Texas Central	May	923	853,479	254,170	1,177,499	356,114	237,976	28,229	410,496	43,772	1,073,981	91.20	103,518	63,796	—2,496	61,265
	5 mos	923	4,169,494	1,246,507	5,804,408	1,590,335	1,208,724	128,198	2,104,013	211,678	5,235,107	90.20	569,301	346,185	100,219	69,662
Houston, East & West Texas	May	191	196,541	40,571	249,806	87,458	67,354	3,737	98,188	8,269	265,006	106.10	—15,200	—23,707	—33,934	—507
	5 mos.	191	996,578	209,345	1,274,564	409,935	308,544	18,260	516,594	41,092	1,287,795	101.00	—13,231	—56,368	—115,315	—32,094
Louisiana Western	May	207	213,154	80,059	319,659	63,409	75,035	11,657	101,922	18,632	274,472	85.90	45,187	24,278	31,184	66,916
	5 mos.	207	1,167,925	423,428	1,726,224	281,327	356,718	60,532	528,024	90,946	1,336,262	77.40	389,962	246,615	253,936	367,960
Morgan's L. & T. R. R. & S. S. Co.	May	400	454,237	130,535	636,944	157,800	169,636	18,655	279,134	35,339	659,515	103.50	—22,571	—71,499	—93,031	—28,115
	5 mos.	400	2,361,426	702,223	3,338,143	741,333	837,838	96,456	1,426,345	180,223	3,289,924	98.60	48,219	—186,224	—281,590	32,832
Texas & New Orleans	May	507	556,452	153,113	752,930	253,599	221,267	12,192	275,803	28,406	765,653	101.70	—12,723	—41,880	—94,090	52,099
	5 mos.	507	2,678,656	794,219	3,741,373	1,171,487	922,138	65,461	1,456,394	138,040	3,625,232	96.90	116,141	—29,899	—252,996	5,065
Spokane International	May	165	76,452	15,195	97,438	19,609	9,039	3,368	31,424	6,368	70,630	72.50	26,808	21,166	13,723	1,445
	5 mos.	165	370,068	80,361	476,817	70,236	45,222	16,238	167,052	30,391	332,689	69.80	144,128	115,413	82,325	68,798
Spokane, Portland & Seattle	May	554	499,953	121,459	678,601	101,561	111,657	10,274	204,269	18,633	452,749	66.70	225,852	157,806	145,282	130,006
	5 mos.	554	2,454,073	586,283	3,339,496	350,109	592,928	45,369	1,013,660	90,652	2,128,279	63.70	1,211,217	857,401	769,693	627,270
Tennessee Central	May	296	184,973	42,960	244,087	35,670	30,558	6,884	83,285	10,351	166,748	68.30	77,339	67,574	51,729	48,400
	5 mos.	296	863,695	202,847	1,144,137	162,233	162,639	32,392	434,257	49,894	841,185	73.50	302,952	263,025	201,963	187,145
Terminal Railroad Assoc. of St. L.	May	37	.....	.....	431,282	93,943	46,730	1,101	146,543	8,129	299,651	69.50	131,631	73,742	159,253	252,221
	5 mos.	37	.....	.....	2,091,398	471,957	228,678	5,069	804,636	44,477	1,571,128	75.10	520,270	217,765	696,997	1,006,569
East St. Louis Connecting	May	1	.....	.....	173,711	26,692	14,388	310	65,012	2,290	108,692	62.60	65,019	56,829	37,097	81,664
	5 mos.	1	.....	.....	965,699	88,537	70,377	1,450	377,071	12,562	549,997	57.00	415,702	371,948	259,408	415,455
St. L. Merchants' Bridge Term.	May	9	.....	.....	334,444	70,383	30,098	999	173,710	6,828	282,018	84.30	52,426	32,510	41,267	103,910
	5 mos.	9	.....	.....	1,964,124	346,864	158,099	4,680	1,003,348	36,087	1,549,078	78.90	415,046	286,376	287,079	557,182
St. Louis Transfer Ry.	May	6	.....	.....	63,426	10,487	6,455	180	35,231	1,250	53,603	84.50	9,823	9,567	4,590	20,310
	5 mos.	6	.....	.....	349,248	46,542	36,436	843	213,757	6,408	303,986	87.00	45,262	44,653	10,215	86,159
Texas & Pacific Ry.	May	1,952	1,768,464	533,880	2,516,801	393,866	567,638	56,552	909,596	409,666	2,315,404	92.00	201,487	49,596	17,557	354,163
	5 mos.	1,952	9,101,169	2,811,993	12,987,062	2,033,136	2,646,857	282,834	4,684,261	767,058	10,431,138	80.30	2,555,924	1,829,122	1,508,919	592,684
Toledo, Peoria & Western	May	247	126,574	33,128	172,502	23,799	38,725	2,065	73,793	6,961	145,343	84.30	27,159	15,655	2,675	—25,917
	5 mos.	247	511,740	215,648	794,530	101,867	184,577	10,976	363,921	35,265	696,211	87.60	98,319	43,759	5,161	—96,773
Trinity & Brazos Valley	May	368	105,443	14,651	126,967	71,343	49,384	3,263	68,020	10,851	202,861	159.80	—75,894	—83,108	—97,774	—33,662
	5 mos.	368	722,173	100,700	863,114	311,185	287,858	16,238	421,495	59,370	1,093,937	126.70	—230,823	—266,863	—364,357	—155,925
Ulster & Delaware	May	128	85,832	19,207	142,563	22,596	20,635	2,150	60,426	6,924	112,731	79.00	29,832	24,332	18,061	13,084
	5 mos.	128	286,552	67,092	514,164	84,055	87,475	9,086	270,544	34,980	486,140	94.50	28,024	443	—19,716	13,139
Union R. R. of Penna.	May	45	.....	.....	1,016,377	142,471	436,569	187	442,800	8,241	1,030,268	101.40	—13,891	—27,391	51,873	366,285
	5 mos.	45	.....	.....	4,492,380	517,371	1,631,877	1,001	2,271,010	40,327	4,461,586	99.30	30,794	—26,706	362,747	1,303,972
Union Pacific	May	3,714	5,597,875	1,513,280	7,951,915	1,504,588	1,719,002	187,030	2,263,406	279,906	6,134,227	77.10	1,817,688	1,159,656	1,063,228	1,762,413
	5 mos.	3,714	29,874,987	6,605,412	40,329,381	4,659,488	8,896,327	740,246	12,192,245	1,426,787	28,682,253	71.10	11,647,128	8,352,308	8,076,127	9,598,174
Oregon Short Line	May	2,363	1,942,682	395,892	2,556,333	599,649	551,545	52,440	801,986	113,972	2,175,581	85.10	380,752	103,623	53,197	233,872
	5 mos.	2,364	11,012,860	1,878,348	13,904,422	2,349,156	2,786,421	226,150	4,509,728	561,901	10,698,302	76.90	3,206,120	1,817,760	1,587,418	1,913,654
Oregon Wash. R. R. & Nav. Co.	May	2,231	1,688,604	391,772	2,400,527	470,104	425,627	69,299	844,860	117,378	1,957,168	85.10	343,359	172,039	67,963	7,337
	5 mos.	2,231	8,807,719	1,934,475	11,746,645	2,028,710	2,007,215	315,142	4,304,936	586,241	9,383,332	79.90	2,363,313	1,508,983	1,098,594	—518,606
St. Joseph & Grand Island	May	258	209,145	20,454	247,452	64,188	47,147	3,208	100,701	12,918	228,162	92.20	19,290	5,858	—2,888	5,180
	5 mos.	258	1,132,976	117,444	1,330,249	228,515	227,270	14,625	555,573	61,596	1,088,286	81.80	241,963	175,268	114,004	75,216
Utah	May	102	92,347	347	93,269	11,909	31,706	354	22,613	5,889	72,471	77.70	20,798	15,607	7,949	4,689
	5 mos.	102	593,088	2,112	597,673	89,505	194,030	1,789	140,549	33,205	459,078	76.80	138,595	102,640	54,380	60,052
Virginian	May	545	1,278,001	68,516	1,457,459	259,427	316,210	12,395	397,784	34,578	1,004,588	68.90	452,871	361,323	363,025	893,207
	5 mos.	545	6,774,161	354,974	7,640,522	866,606	1,763,415	62,077	2,283,746	135,006	5,082,588	66.50	2,557,934	1,903,838	1,922,046	3,436,711
Wabash	May	2,486	4,013,316	772,447	5,181,056	885,266	993,898	133,547	2,036,642	163,307	4,238,379	81.80	942,677	706,193	439,966	999,816
	5 mos.	2,486	21,114,349	3,715,942	26,709,481	3,943,976	4,929,594	671,537	10,940,710	819,883	21,433,608	80.20	5,275,873	4,108,095	2,625,328	3,330,297
Western Maryland	May	804	1,372,290	66,598	1,535,610	223,211	325,233	37,822	497,090	45,159	1,142,540	74.40	393,070	313,070	257,804	412,278
	5 mos.	804	7,444,436	327,959	8,174,357	1,080,490	1,786,943	180,753	2,727,754	226,949	6,067,651	74.20	2,106,706	1,676,706	1,549,125	1,873,211
Western Pacific	May	1,042	810,559	166,081	1,057,365	329,826	200,228	36,393	382,781	35,493	1,007,795	95.30	49,570	—34,852	19,759	260,722
	5 mos.	1,042	3,791,390	749,070	4,881,263	1,036,651	1,036,547	174,812	1,805,345	194,121	4,337,552	88.90	543,711	125,142	422,540	730,108
Wheeling & Lake Erie	May	511	1,356,233	55,039	1,540,624	244,145	385,022	27,020	516,133	39,725	1,214,621	78.80	326,003	218,557	209,499	331,327
	5 mos.	511	7,034,220	287,087	7,809,729	960,549	2,040,951	128,770	2,714,473	181,276	6,038,408	77.30	1,771,321	1,212,077	1,045,832	654,825

Wage Statistics for April

The summary of wage statistics for the month of April, 1924, issued by the Interstate Commerce Commission, shows a total of 1,707,217 employees, an increase of 26,949, or 1.5 per cent, over the number reported to March, 1924. Owing to seasonal requirements, an increase of 49,849 employees appears in the maintenance of way group, but this number was offset somewhat by reductions in the maintenance of equipment, and the transportation groups. Notwithstanding an increase of 1.7 cents per hour in the straight time wages of train and engine service employees, which is perhaps the reflection of recent wage adjustments, the average hourly earnings of all employees, owing to an increase in the number of lower paid employees and a reduction in the number of the higher paid employees reported on an hourly basis, shows a decrease of 4 mills per hour. There was also a decrease in the quantity of overtime work and in the average overtime rate per hour. The total compensation in April was 1.9 per cent less than in March. Compared with the returns for the corresponding month last year, the employment in April, 1924, decreased 3.1 per cent and the total compensation shows a decrease of 3.6 per cent. The monthly earnings, by groups, were as follows:

	Monthly earnings of—			
	Employees reported on daily basis		Employees reported on hourly basis	
Group	April, 1924	April, 1923	April, 1924	April, 1923
Executives, officials and staff assistants	$434	$426	...	...
Professional, clerical and general	182	178	$124	$120
Maintenance of way and structures	240	239	89	88
Maintenance of equipment and stores	243	242	123	125
Transportation (other than train, engine and yard)	98	95	122	118
Transportation (yardmasters, switch tenders and hostlers)	256	253	147	145
Transportation (train and engine service)	...	...	182	188

Crow's Nest Agreement in Effect

On Monday of this week the Crow's Nest Pass Agreement providing for a low maximum for freight rates on a list of specified commodities again became fully effective in Western Canada. Its resumption of effect came automatically with the abstention of the federal Parliament last week from any legislative action to further suspend its operation. The agreement was entered into in 1897 between the Canadian Pacific and the federal government by which in return for certain exclusive rights and a subsidy for the building of the Crow's Nest Pass Railway in Southern Alberta the Canadian Pacific was to give reduced rates on grain eastbound from the Prairie provinces and on various commodities of special value to meet the requirements of the settlers going into those provinces. That agreement was effective until 1918 when under the War Measures Act a moratorium with respect to that pact was declared, the suspension to be for three years. That moratorium was to expire on July 6, 1922, and in the Parliamentary session of that year a special committee was named and made an exhaustive inquiry into Western freight rates. As a result of that committee's report Parliament suspended the operation of the agreement for another year, with the exception of the rates on grain and flour, the rates of the agreement on these becoming effective. Then in 1923 the federal government ordered another year's suspension. That expired on July 6 this year. In the absence of any Parliamentary action to the contrary it again became fully effective. This did not occur, however, before the railways made a strong protest to the Federal Cabinet two weeks ago against allowing the pact to come into force again. They argued that it would only intensify the discrimination in rates between different sections of the country. The Western provinces, however, through H. J. Symington, a prominent Winnipeg lawyer, argued in favor of the agreement that such a pact must be adhered to. Also Mr. Symington recalled that before the Parliamentary Committee in 1922 E. W. Beatty, president of the Canadian Pacific, and D. B. Hanna, then head of the Canadian National Railways, predicted that the restoration of the Crow's Nest rates would mean a loss of $15,000,000 to the C. P. R. and $10,000,000 to the Canadian National. Mr. Symington said that instead the two road's earnings continued to increase.

Traffic News

Local loading of freight along the lines of the Missouri Pacific during June was better than in any previous corresponding month, the daily average local loading being 3,106 cars, while the number of cars received from connecting lines averaged 4,346. The loadings so far this year are higher than for the same period of any previous year except 1917.

The Chicago Great Western is offering $100 in prizes to persons submitting the best name for its night passenger train from Chicago to Minneapolis, Minn., leaving Chicago at 6 o'clock. The one submitting the winning name will be awarded $50 and the ten next best will receive $5 each. Any one is eligible to participate except Chicago Great Western employees.

The Southwestern Industrial Traffic League, the Texas Industrial Traffic League and the Car Service division, of the American Railway Association, held a joint conference on July 4 and 5 at Galveston, Tex., which was attended by more than 200 traffic men and railway representatives. At a special session the Southwestern Industrial Traffic League afterward discussed many rate controversies that are now before the Interstate Commerce Commission.

The Norfolk & Western announces a regular sleeping car between Chicago and Norfolk, Va., a car leaving Chicago daily at 11:40 p. m. over the Pennsylvania, via Cincinnati, and arriving at Norfolk the second morning at 8:30. Sleeping car service has also been established between Chicago and Winston-Salem, N. C., a car leaving Chicago daily at 9:30 a. m. and arriving at Winston-Salem the following evening at 5:10.

The Port Terminal Railroad Association of Houston, Tex., has been organized to operate the railroad connections to the Houston ship channel. All of the railroads that connect with the deep water port of Houston are members of the association. The association was formed so that all ocean shipments can be given a one-line rate to any dock. The cost of operation will be divided among the railroad members of the association.

The Denver Scenic Line Service Club has been organized by employees of the Denver & Rio Grande Western to promote courtesy and kindly consideration of the traveling public. The officers elected were, president, J. A. Gallagher, commerce and valuation counsel; vice-president, Harry Griggs, secretary of the Local Association of Mechanical Crafts; treasurer, Thomas H. Marshall; assistant treasurer and secretary, W. J. McBride of the valuation department.

Judge J. Foster Symes, of the federal court at Denver, Colo., has ruled that a railroad which, although unwillingly and innocently, aids in the violation of the law concerning the shipment of alcohol must suffer the loss of its freight charges, in a case where railroads transporting a carload of alcohol from New York to the Empire Products Company, Denver, Colo., endeavored to collect the transportation charges from federal authorities at Denver. At Pueblo, Colo., the shipment was seized by federal authorities and ordered destroyed and on one appeared to claim it. The transportation charges were about $700.

Five hundred dollars profit is said to have resulted from the first eastbound trip of the New York-San Francisco air mail. In a statement from the office of the postmaster at San Francisco it is said that the revenue on this trip was $2,308.48 for 8,000 pieces of mail; while it is estimated that the cost of the trip was 66 cents a mile or $1,770. After the first trip, each way, the air mail has consisted largely, it is said, of remittances by banks, insurance companies and other financial institutions. It is calculated that these parties are making large savings in interest by delivering their remittances in distant cities a day or two earlier than has heretofore been possible.

Equipment and Supplies

Locomotives

THE MONTANA, WYOMING & SOUTHERN has ordered 1 Mikado type locomotive from the Baldwin Locomotive Works.

THE CALIFORNIA FRUIT EXCHANGE, Blairsden, Cal., has ordered 1 Prairie type locomotive from the Baldwin Locomotive Works.

THE FERROCARRIL DEL PACIFICO, Colombia, South America, has ordered 2 Mountain type locomotives from the Baldwin Locomotive Works.

THE SEABOARD AIR LINE, reported in the *Railway Age* of May 31 as inquiring for 10 Mountain type and 15 Mikado type locomotives, has ordered 20 Mikado type and 10 Mountain type locomotives from the Baldwin Locomotive Works.

Freight Cars

THE CAMBRIA & INDIANA is inquiring for repairs to 200 hopper cars.

THE WAR DEPARTMENT is inquiring for 8 narrow gage platform cars.

THE CHESAPEAKE & OHIO is inquiring for repairs to 500 gondola cars.

THE CARNEGIE STEEL COMPANY is inquiring for 20 tank cars of 12,500 gal. capacity.

CARR BROTHERS, New York, are inquiring for 10 narrow gage box cars and 10 standard gage box cars.

THE UNION REFRIGERATOR TRANSIT COMPANY has ordered 500 refrigerator cars from the American Car & Foundry Co.

THE WESTERN FRUIT EXPRESS, reported in the *Railway Age* of June 28 as inquiring for 1,000 underframes, has ordered 500 from the American Car & Foundry Co.

THE GREAT NORTHERN, reported in the *Railway Age* of June 21 as inquiring for 100 underframes, will build this equipment in its own shops.

THE AMERICAN ROLLING MILL COMPANY, Middletown, Ohio, reported in the *Railway Age* of April 12 as inquiring for 12 gondola car bodies of 50 tons' capacity, has ordered 6 gondola car bodies from the Pressed Steel Car Company.

THE NITRATE RAILWAYS COMPANY, Chili, reported in the *Railway Age* of May 31 as inquiring for 100 flat cars of 35 tons' capacity, has ordered 200 flat cars from the Metropolitan Carriage, Wagon & Finance Co., Ltd., Saltley, Birmingham, England.

Passenger Cars

THE NEW YORK CENTRAL, reported in the *Railway Age* of July 5 as having ordered 28 horse cars from the Merchants Dispatch Transportation Company, will build these cars in its own shops at West Albany, N. Y.

Iron and Steel

THE MISSOURI PACIFIC has ordered 225 tons of structural steel from the American Bridge Company.

THE CHICAGO UNION STATION COMPANY has ordered 100 tons of structural steel for track slab construction from the Concrete Steel Company.

Machinery and Tools

THE SOUTHERN RAILWAY has placed an order for a 2,500-lb. steam hammer.

THE ATCHISON, TOPEKA & SANTA FE has placed an order for a two-spindle frame drill.

Track Specialties

THE NEW YORK CENTRAL is inquiring for from 15,000 to 22,000 kegs of spikes.

THE MISSOURI PACIFIC is considering the purchase of a quantity of spikes and bolts.

THE CHICAGO, ROCK ISLAND & PACIFIC is considering the purchase of rails and track supplies.

THE CANADIAN NATIONAL has ordered 30,000 tons of rails from the British Empire Steel Corporation.

THE NORFOLK & WESTERN is inquiring for 47,500 tons of rails for October, 1924, to April, 1926, delivery.

Signaling

THE CHESAPEAKE & OHIO has ordered from the Union Switch & Signal Company a 43-lever electro-pneumatic interlocking for installation at Russell, Ky. Style "A-1" switch and lock movements will be used, together with color light signals on bridges. Also an electro-pneumatic interlocking for West Ashland, Ky., a 31-lever machine, and color light signals. Also an electro-pneumatic interlocking for Cliffside, Ky., 31 levers, and color light signals.

THE ILLINOIS CENTRAL has placed a contract with the Union Switch & Signal Company for the material for the Union two-speed continuous inductive automatic train control system to be installed on the main line between Champaign, Ill., and Branch Junction, 122 miles, double track. Sixty locomotives are to be equipped with the train control apparatus. All of the material will be installed by the railroad company's forces.

LOCOMOTIVES ORDERED, INSTALLED AND RETIRED

Month	Domestic orders reported during month	Installed during month	Aggregate tractive effort	Retired during month	Aggregate tractive effort	Owned at end of month	Aggregate tractive effort	On order first of following month	Building in R. R. Shops
September	8	384	22,342,517	260	7,191,302	64,720	2,506,469,051	1,242	7
October	50	408	21,665,487	301	7,935,709	64,827	2,520,200,846	942	15
November	49	333	19,054,713	282	7,741,395	64,879	2,532,085,380	739	14
December	12	333	18,260,423	316	8,738,378	64,896	2,541,607,425	510	14
Full year 1923	1984*	4037*	.....	3672	.....	.....	.....	...	..
1924									
January	125	271	15,228,895	178	4,447,721	64,989	2,552,694,953	439	14
February	85	214	11,296,088	175	4,906,435	65,029	2,559,519,253	457	10
March	283	176	10,457,064	181	6,033,173	64,911	2,560,076,766	520	7
April	100	97	4,167,388	112	2,881,385	64,896	2,561,362,769	552	11
May	107	153	6,949,353	107	2,600,445	64,942	2,565,706,413	447	10
June	1	...	.....	...	.....	.....	.....	...	..
Total for 5 months	..	911	.....	...	.....	.....	.....	...	..
Total for 6 months	..	701	.....	...	.....	.....	.....	...	..

Details as to orders from *Railway Age* weekly reports. Figures include all domestic orders placed with builders and railroad shops, but not rebuilt equipment.

Figures as to installations and retirements prepared by Car Service Division, A. R. A., published in form C. S. 56A-1. Figures cover only those roads reporting to the Car Service Division. They include equipment received from builders and railroad shops. Figures of installations and retirements alike include also equipment rebuilt to an extent sufficiently so that under the accounting rules it must be retired and entered in the equipment statement as new equipment. Figure as to orders as given in first column of table is not therefore comparable with figures relating to installations given in succeeding columns.

* Corrected figure.

Supply Trade News

The Truscon Steel Company has moved its Chicago office to 165 E. Erie street.

The Barco Manufacturing Company of Canada has moved into larger space in the Tower building, Devonshire Road, Walkerville, Ont.

John W. Fogg, general sales manager of the Boss Nut division of the **American Bolt Corporation,** has been promoted to assistant to the vice-president.

The Gibb Instrument Company, Bay City, Mich., has placed **W. F. Hebard & Company,** 551 W. Van Buren street, Chicago, in charge of its office in that city.

F. M. English, who has been in the service of the **Reading Iron Company,** Reading, Pa., since 1919, has been appointed assistant sales manager to succeed A. F. McClintock, resigned.

Charles Corwin, superintendent in the field of the **Roberts & Schaefer Company,** Chicago, has been promoted to general superintendent of construction, succeeding P. T. Brackett, resigned.

C. A. Fisher has been appointed district representative of the **Central Iron & Steel Co.,** Pittsburgh, Pa., with offices at 303 Keystone building, Houston, Tex., and 1918 W. T. Waggoner building, Fort Worth.

J. V. Miller has resigned as district storekeeper of the Chicago, Milwaukee & St. Paul at Deer Lodge, Montana, to become western sales representative of the **Prime Manufacturing Company,** with headquarters at Milwaukee, Wis.

The Fairmont Railway Motors, Inc., has opened a Pacific coast branch office at 637 Mission street, San Francisco, Calif. **R. W. Jamison** has been appointed district sales manager for the states of California, Washington, Oregon and Nevada.

The New York City office at 2612 Grand Central Terminal, of the **Kirby Lumber Company,** Houston, Texas, was taken over on July 1 by **Ray Wiess,** who will continue the office in his name. Mr. Wiess will offer the Kirby products in the territory formerly covered by the New York office.

The Roberts & Schaefer Company, Chicago, engineers and contractors for locomotive coaling plants and the **R. H. Beaumont Company,** Philadelphia, Pa., builders of boiler house coal and ash handling plants, have made arrangements whereby the Roberts & Schaefer Company has the exclusive right to use certain Beaumont patents on railroads and the R. H. Beaumont Company has the exclusive right to use certain coal handling patents owned by the Roberts & Schaefer Company.

The Bassick-Alemite Corporation, Chicago, has purchased the Allyne-Zerk Company, Cleveland, O., manufacturer of high pressure lubricating systems, and will operate it as an independent unit but under the same general management as the other seven companies controlled by the corporation. **E. W. Bassick,** president of the corporation, is chairman of the executive committee which directs the corporation. **E. S. Evans,** president of E. S. Evans & Company, Detroit, has been made vice-president and general sales manager of the corporation and will have charge of the sales of all the units.

The Mellon Institute of Industrial Research of the University of Pittsburgh has founded an Industrial Fellowship on the treatment of timber. This research, which is being sustained by the Grasselli Chemical Company, Cleveland, Ohio, and is being conducted by Dr. A. M. Howald, has for its purpose a study toward improvement of the methods of applying zinc chloride in the wood-preservation industry. Investigational work which was begun during 1923 will be continued throughout the present year. An experimental wood-impregnating plant is maintained for practical tests of processes. Research is at present being done on the development of a method of increasing the permanence of zinc chloride treatments of timber by the addition of petroleum oils.

Fred P. Pfahler, district master mechanic of the Baltimore & Ohio, with headquarters at Pittsburgh, Pa., has resigned to become associated with the professional staff of the **Roberts-Pettijohn-Wood Corporation,** engineers and accountants, Chicago. He will devote his entire time to professional work in connection with the introduction of modern methods and improved practices in railway shop management and operation, and as a consultant in railway mechanical engineering work. Mr. Pfahler has spent more than 30 years in railway mechanical engineering work, principally in the employ of the Wheeling & Lake Erie and the Baltimore & Ohio. For four years he was with the Interstate Commerce Commission's Locomotive Inspection Bureau as an inspector. During the period of federal control be served as chief mechanical engineer and as a member of the Committee on Standards of the Central Organization of the United States Railroad Administration. At the conclusion of federal control he returned to the Baltimore & Ohio as district master mechanic

Obituary

Benjamin G. Lamme, chief engineer of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and a well-known electrical genius and inventor, died on July 8 at East Liberty, Pa., after an illness of several months. Mr. Lamme was born 60 years ago on a farm near Springfield, Ohio, and pioneered in the field of electricity when text books were almost unknown; he designed many of the standard types of generators and motors in use today. He became associated with the Westinghouse interests in their infancy and for many years served as chief engineer. About 150 inventions are reported to Mr. Lamme, including the umbrella type generator, used at Niagara Falls, the high tension system of power transmission and the synchronous converter, employed notably on the subway systems of New York for changing alternating to direct current. His conception of the single phase alternating current now in use on street cars and long electric transit systems revolutionized the industry in the early nineties. Mr. Lamme recently designed a 62,500 kw. generator, the largest ever built. Last year he was cited by Ohio State University as the greatest living mathematician, an honor which previously had been bestowed only twice, upon Mr. Edison and Mr. Steinmetz. As a student of Ohio State, Mr. Lamme was a prodigy of mathematics and a youthful master of high-range multiplication tables and differential calculus, who discovered many short cuts in mental calculation. This latter was of great help to him later on in life, as most of his inventions were products of intricate calculation and great imagination. Mr. Lamme's researches were largely confined to the industrial field and were devoted to the solution of power problems in big units. He designed the generating and motor equipment for the first big railway electrification, that of the New York, New Haven & Hartford railroad. He received the highest honor from the American Institute of Electrical Engineers, having been awarded the Edison medal in 1919. He served as one of the two members of that body on the Naval Consulting Board during the war, and was made chairman of the invention committee of the board.

B. G. Lamme

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—This company has completed plans for the construction of a passenger station at Canyon, Tex. The structure will be of steel and concrete construction, with stucco and brick finish, a tile roof and will cost approximately $65,000.

ARIZONA EASTERN.—This company has applied to the Interstate Commerce Commission for a certificate for the construction of 172.5 miles of line in Arizona, including a new main line from a connection with the Southern Pacific at Picacho to a connection with the Arizona Eastern at Chandler, 50.5 miles; a branch line leaving this line at the crossing of the Gila river and extending to a point on the north bank of the Gila river opposite Florence, 7 miles; and a new main line connecting with the Arizona Eastern at Hassayampa and extending to a connection with the Southern Pacific at Dome, 115 miles. The application states that the new construction will provide a more direct route to Phoenix and the rich agricultural section of the Salt river valley and the important mining district east thereof; afford access to the Casa Grande valley irrigation project; provide the Southern Pacific with an additional main line across the greater part of the state of Arizona in a more favorable location than the present line; and greatly improve the railroad facilities and service of Arizona.

CANADIAN PACIFIC.—This company has awarded a contract to W. A. Dutton & Sons, Winnipeg, Man., for the grading of 25 miles of a branch line from Kipp, Alberta, to Little Bow.

CANADIAN PACIFIC.—D. C. Coleman, vice-president of this company, said recently in regard to the contemplated electrification of the Rocky Mountain section of the line: "The company has for some time been preparing studies and surveys in connection with the proposed electrification of the line between Lake Louise and Revelstoke. A considerable force is now engaged in this work and it is hoped that definite plans and recommendations can be placed before the executives of the company within a few months. It is, of course, a project of great magnitude and will therefore in all probability require prolonged consideration."

CENTRAL VERMONT.—This company has awarded a contract to the Roberts & Schaefer Company, Chicago, for the construction of a 200-ton frame coaling station and cinder plant at Brattleboro, Vt.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—This company has awarded a contract to the Kuert Contracting Company, Indianapolis, Ind., for the construction of a pump house at Mt. Jackson, Indianapolis.

FLORIDA, WESTERN & NORTHERN.—The Interstate Commerce Commission has issued a certificate of public convenience and necessity to the Florida Western & Northern, a subsidiary of the Seaboard Air Line, for the construction of 229 miles of new line in Florida which will provide, in connection with the existing lines of the Seaboard, a fairly direct cross-state line from West Palm Beach, Fla., to Tampa. The main line of the new company is to extend from Coleman to West Palm Beach, 205 miles, and a line from Callahan to Gross, 14 miles, is intended to serve as a link in the Seaboard's through line to the north, while a line from Valrico to Welcome Junction, 10 miles, is intended to shorten the distance between Tampa and West Palm Beach.

MISSOURI PACIFIC.—This company is reported to be contemplating the construction of a freight station at McGehee, Ark.

MISSOURI PACIFIC.—This company contemplates the construction of a branch line from Venice, Ark., to Crossett, a distance of 10 miles.

NORTHERN PACIFIC.—This company plans the construction of a 12-mile branch line to Shelton, Wash.

PENNSYLVANIA.—This company has awarded a contract to the Whiting-Turner Construction Company, Baltimore, Md., for the application of concrete floors on its bridges over the Susquehanna river between Sunbury and Northumberland, Pa. The work will involve the expenditure of approximately $65,000.

PITTSBURGH, FORT WAYNE & CHICAGO.—This company has applied to the Interstate Commerce Commission for authority for the construction of a line from Canton to Bayard, Ohio, 15 miles.

PRESCOTT & NORTHWESTERN.—The Interstate Commerce Commission has extended the time in which this company may begin the construction of an extension of 26 miles from Prescott, Ark., from July 1, 1924, to January 1, 1925, and has granted permission to retain for five years all of the earnings of the new line in excess of the amount provided in section 15a of the interstate commerce act. In issuing the original certificate authorizing this construction the commission denied the petition to retain the excess earnings.

READING.—This company has awarded a contract for the furnishing and erection of a passenger station on the northbound side and a waiting room on the southbound side at Oaklyn, N. J., on its seashore lines, to George H. Evans, Inc., Philadelphia.

SOUTHERN PACIFIC.—This company, jointly with the El Paso & Southwestern, contemplates lowering its tracks in the city of El Paso, Tex., to eliminate grade crossings.

ST. LOUIS-SAN FRANCISCO.—This company will close bids on July 14 for the construction of a brick and concrete passenger station at Neodesha, Kan. Bids for the construction of a stucco passenger and freight station at Sikeston, Mo., reported in the *Railway Age* of June 28, will be closed on July 7.

T. & N. O. to Be Extended

Premier G. Howard Ferguson, of Ontario, announced last week in Toronto that the Ontario government had decided to continue the new Kirkland Lake branch of the Temiskaming & Northern Ontario Railway to the new Rouyn gold district in Northwestern Quebec, a charter having been secured from the Dominion government. It is estimated that this extension will cost $1,500,000. Premier Ferguson stated that the Ontario government is in a position to let the contracts at any time, upon a month's notice. Trains are now running as far as Kirkland Lake. The Temiskaming & Northern Ontario, which is owned and operated by the Ontario government, has a total mileage of 373, and the new extension will increase that mileage by nearly 60 miles.

Tunnel Proposed for Ottawa

A 2,000-foot tunnel under the city of Ottawa to provide a speedier access from the West to the union station will shortly be discussed by the City Council of the Canadian capital. The scheme has been under discussion by the Ottawa Town Planning Commission which last week unanimously decided to recommend it to the council. The project is to provide a short route under the city for trains which now lose much time in passing around by way of Hull or Rideau Junction, in the former case having to cross and recross the Ottawa river before reaching the union station. Linked up with the tunnel proposal is a scheme for the construction of a new bridge over the Ottawa river for steam railway, radial and vehicular traffic. The proposed tunnel would be much shorter than that proposed by the Canadian Pacific Railway in 1910 but which was later abandoned.

PLANS FOR THE amalgamation of the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen have been abandoned. A special committee, reporting on the subject at the convention in Cleveland, O., on June 28, stated that it was unable to overcome the difficulties in the way of finding a suitable method of merger.

THE RAILROAD LABOR BOARD has issued a call for a hearing on July 24 in the wage controversy between the Western railways and the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen. Representatives of the brotherhoods were given until July 10 to say whether they will attend the hearing voluntarily. The employees' representatives failed to attend a hearing on June 20, the date first set by the Board. The labor board has announced that if the brotherhood officers fail to advise that they will appear subpoenas will be issued to compel their attendance.

Railway Financial News

ANN ARBOR.—*Floating Equipment Bonds.*—This company has been authorized by the Interstate Commerce Commission to guarantee $800,000 of Ann Arbor Boat Company floating equipment 6 per cent bonds to be sold at not less than 90½ and the proceeds used for the purchase of a car ferry.

CANADIAN NATIONAL RAILWAYS.—*Director Resigns.*—James Stewart, of Winnipeg, has resigned from the board.

CAPE GIRARDEAU NORTHERN.—*Auction Sale.*—The sale of this road on July 2 at the Common Pleas Courthouse, Cape Girardeau, Mo., on July 2, was ordered adjourned pending further action by the court, in view of the fact that no bid was submitted when it was placed on the auction block. The three special masters, Montague Lyon, James A. Grover, St. Louis, Mo., and Clarence L. Grant of Jackson, present receiver for the company, will make a report concerning the sale price to the court on July 23.

CHESAPEAKE & OHIO.—*Equipment Trust.*—The Interstate Commerce Commission has authorized an issue of $18,000,000 of 5 per cent equipment trust certificates to be sold to J. P. Morgan & Co., at 98.

CHICAGO & NORTH WESTERN.—*Annual Report.*—This company's annual report for 1923 is reviewed in an article on another page of this issue entitled "North Western Reports Decrease in Net Income." See also excerpts from annual report on adjacent pages.

CHICAGO, ROCK ISLAND & PACIFIC.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Coalgate to Lehigh, Okla., 5 miles.

EL PASO & SOUTHWESTERN.—*Proposed Acquisition.*—See Southern Pacific.

ENSLEY SOUTHERN.—*Receivership.*—On petition of the Southern Railway, Judge W. M. Walker, of the Jefferson Circuit Court, Ala., on July 1 appointed A. B. Aldridge receiver of the Ensley Southern, a 33-mile line controlled by the Southern. The Southern declares in its bill of complaint that the Ensley Southern owes in excess of $1,000,000 of unsecured claims and a bonded debt of $1,177,000, and that it is unable to further finance itself. The complainant states that operating revenues of the Ensley Southern are insufficient to meet operating expenses, and that it is not able to secure any money from any source to pay operating or other expenses.

HOCKING VALLEY.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $981,000 of general mortgage 6 per cent bonds and to pledge $933,000 of them with the director general of railroads as security for its indebtedness of $700,000 for additions and betterments during federal control.

IRONTON.—*Purchase Price.*—The Interstate Commerce Commission has issued an amendment to the report in which it authorized the Lehigh Valley and the Reading Company to purchase the stock of this company for $1,400,000, to authorize an increase in the price to be paid to $1,500,000.

KANSAS CITY SOUTHERN.—*Valuation.*—This company has filed a petition in the Supreme Court of the District of Columbia for a writ of mandamus to compel the Interstate Commerce Commission, in connection with its valuation of this company's property, to report the original cost, the true economic value, other values and elements of value, and an analysis of methods.

LORAIN, ASHLAND & SOUTHERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Lorain to Custaloga, Ohio, 66½ miles.

MINNESOTA WESTERN.—*Securities.*—This company has applied to the Interstate Commerce Commission for authority to issue $1,500,000 of preferred stock and $135,000 of first mortgage 5 per cent bonds to be used in acquiring the property of the Electric Short Line.

MISSOURI-KANSAS-TEXAS.—*Notes.*—This company has applied to the Interstate Commerce Commission for authority to issue $4,750,000 of 6 per cent secured gold notes and to pledge as security therefore $6,100,000 of prior lien 6 per cent bonds. The notes are to replace two notes, one for $2,500,000 and one for $2,250,000, which were purchased by White, Weld & Co., from the director general of railroads.

MISSOURI PACIFIC.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $23,810,000 of first and refunding mortgage 6 per cent gold bonds to reimburse the treasury for expenditures and to provide funds for additions and betterments during 1924 amounting to $8,399,116.

ROCK ISLAND, ARKANSAS & LOUISIANA.—*Abandonment.*—This company and the Chicago, Rock Island & Pacific have filed a joint application for authority to abandon the line from Winnfield to Packton, La., 10 miles.

SEABOARD AIR LINE.—*Bonds.*—This company has been authorized by the Interstate Commerce Commission to have authenticated and delivered $4,750,000 of 4 per cent refunding mortgage bonds and to pledge them under its first and consolidated mortgage. Authority was also granted to issue $712,000 of first and consolidated mortgage bonds, $265,500 to be pledged with the secretary of the treasury, and $446,500 to be held in the treasury.

SOUTHERN PACIFIC.—*Asks Authority to Acquire E. P. & S. W.*—This company has applied to the Interstate Commerce Commission for authority to acquire all the assets and property of the El Paso & Southwestern system from the El Paso & Southwestern company, the holding company, by exchanging for such property $28,000,000 par value of its common stock and $29,400,000 of its 5 per cent collateral trust 20-year bonds in accordance with a contract dated June 20, 1924. Authority was also asked for the issuance of these securities by the Southern Pacific. The application states that the properties to be acquired have a fair value of not less than $57,400,000. In support of the application the Southern Pacific stated that the lines of the Southern Pacific, the Southwestern system and the Chicago, Rock Island & Pacific system unite to form one of three fiercely competing routes between Chicago and the Missouri river, on the one hand, and southern California on the other, and that the Union Pacific and its eastern connections and the Santa Fe constitute the other two competitors for traffic between the middle west and southern California. "The union of the Southern Pacific and the El Paso systems," it said, "will result in direct physical connection between the Southern Pacific and the lines of the Rock Island, its essential eastern connection, will reduce the number of operating companies comprising the through route, will increase the competitive strength thereof, will bring about better co-ordination of service between the constituent lines, will simplify their relations to the public in the conduct of business and in the settlement of claims and will simplify their relations to the public authorities. Through the direct operation of the El Paso & Southwestern system by the Southern Pacific great operating economies will be effected and greater unification of standards and practices will be made possible. The relief sought is in harmony with the policy and purposes of the Transportation Act and is consistent both with the commission's tentative consolidation plan and with the accompanying report of Professor Ripley. The addition of the El Paso & Southwestern between El Paso and Tucson in connection with certain new construction, will obviate the necessity that the Southern Pacific would otherwise be under of constructing an extensive second track, thus saving unnecessary duplication of tracks and avoiding an increase of capital charges." The new construction referred to is included in an application filed simultaneously by the Arizona Eastern for a certificate authorizing the construction of 172½ miles of new line in Arizona connecting with the Southern Pacific.

SOUTHERN RAILWAY.—*Annual Report.*—See excerpts from annual report on adjacent pages.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS.—*Bonds.*—This company has been authorized by the Interstate Commerce Commission to sell $2,000,000 of general mortgage 4 per cent bonds at not less than 81½, the proceeds to be used for additions and betterments.

(*Continued on page* 88)

Annual Reports

Sixty-Fourth Annual Report of the Chicago and North Western Railway

To the Stockholders of the Chicago and North Western Railway Company:

The Board of Directors submits herewith its report of the operations and affairs of the Company for the year ending December 31, 1923.

Average mileage of road operated, 8,462.53.

OPERATING REVENUES:		
Freight	$113,092,825.75	
Passenger	30,390,660.14	
Other Transportation	13,958,288.97	
Incidental	2,984,190.21	
		$160,425,965.07
OPERATING EXPENSES (82.60 per cent. of Operating Revenues)		132,507,531.40
Net Revenue from Railway Operations		$27,918,433.67
RAILWAY TAX ACCRUALS (5.78 per cent. of Operating Revenues)	$9,277,408.66	
UNCOLLECTIBLE RAILWAY REVENUES	64,138.27	
		9,341,541.93
Railway Operating Income		$18,576,891.74
EQUIPMENT AND JOINT FACILITY RENTS—Net Debit		2,733,516.77
Net Railway Operating Income, forwarded		$15,843,374.97
NONOPERATING INCOME:		
Rental Income	$961,770.70	
Dividend Income	2,798,834.00	
Income from Funded Securities	18,527.43	
Income from Unfunded Securities and Accounts, and Other Items	757,074.22	
		4,536,206.35
Gross Income		$20,379,581.32
DEDUCTIONS FROM GROSS INCOME:		
Rental Payments	$21,346.17	
Interest on Funded Debt	11,440,568.71	
Other Deductions	180,198.46	
		11,642,113.34
Net Income		$8,737,467.98
DIVIDENDS:		
7% on Preferred Stock	$1,567,650.00	
4% on Common Stock	5,806,100.00	
		7,373,750.00
Balance Income for the Year		$1,363,717.98

GENERAL REMARKS

BUSINESS CONDITIONS AND TRAFFIC

The conditions affecting the traffic and revenue of your company in 1923 were somewhat abnormal. The volume of its traffic was much larger than in 1922 and its gross revenue greater, but owing chiefly to the effect of rate reductions and to largely increased expenses for maintenance of its equipment as a result of the shopmen's strike in 1922, its net return was less.

During the year 1923 your company carried 9,248,615,383 tons of revenue freight one mile. This was 22.02% more than was carried in 1922, but 3.25% less than in 1920. In the latter year your company carried the greatest amount of traffic ever handled by it in any one year.

The freight revenue in 1923 increased 12.31% over that of 1922. The reason that the revenue did not increase proportionately with the increased volume of traffic is to be found, in part, in the fact that the additional tonnage consisted to a greater extent of commodities which bear relatively low rates than of those that bear higher rates; and also in the fact that certain rate reductions were made during the year; and of course in the further fact that all rate reductions made during 1922 affected all business done in 1923.

The principal rate reduction made this year was the one of 10% on iron ore, ordered by the Interstate Commerce Commission, effective May 15, 1923. It deprived your company of approximately one million dollars in revenue that would have been received under rates in effect prior to the above date, with the result that, while the company handled 10,266,799 tons of ore in 1923, or about 12% more than in 1922, it earned about $114,000 less revenue thereon than was earned on the smaller tonnage of the previous year.

There has been no improvement in the passenger traffic as a whole. The long distance travel has been steadily increasing, but the benefits that come from these increases are more than offset by the shrinkage in volume of short-haul traffic, other than commutation. In 1917, which is about the time the use of the automobile had reached a point where it was an important factor, your company carried 16,702,885 passengers in local intrastate traffic. In 1923 there were only 8,133,518 such passengers. This loss of over 50% in this class of business resulted in reducing the revenue in 1923 by over eight million dollars. For the most part this loss is attributable to the increase in the use of automobiles and motor buses for short distance travel. The motor bus operation has been largely brought about by the building, with public funds, of paved highways paralleling the railroads in all the states we run through. Your company has endeavored to meet this situation by reductions in passenger train mileage whenever permitted to do so.

Your company handles a large volume of commutation passenger traffic between Chicago and its suburbs. The number of commutation passengers carried each year is much greater than the number of passengers carried in all other passenger service, although the distance traveled is much less. The number of commutation passengers in 1923 was 22,261,225 and the number of all other passengers was 10,742,980. The volume of this traffic is constantly increasing at a rapid rate. The rates in effect for this service are not compensatory. The average rate per mile is slightly less than 1.1 cents. On all intrastate traffic of this character, which constitutes nearly all of it, the rates are only 10% higher than they were in 1913. This 10% increase was made in 1918. Your company sought to have these rates increased proportionately with other passenger rates in 1920. Relief was denied by the State Commission. An application was thereupon made to the Interstate Commerce Commission. The case was heard by that Commission in the fall of 1920, but it has not yet rendered its decision thereon, although earnest efforts have been made to have the matter determined. All of the things that have occurred to increase the cost of operation have affected the cost of this service in the same way and to practically the same extent every other form of service has been affected.

The combined business of all classes produced operating revenue during the year of $160,425,965.07. This was 9.81% more than that earned in 1922. Operating expenses were $132,507,531.40, being 11.17% greater than in 1922. The taxes were $9,277,408.66, 3.1% greater than they were in 1922.

Transportation expenses were $66,508,610.58. This was 5.47% more than in 1922. With this increase in transportation expense your company handled 22.02% more tons of freight one mile. The increase in transportation expenses was, therefore, no greater than normal. Had it not been for the economies brought about as results of previous expenditures for improvements in grades, betterment of terminals and improved equipment, together with the determined effort to economize in the operation of trains and yard service, such an increase in traffic would have resulted in a considerably greater increase in transportation expenses.

The following statistics reveal the extent to which these economies were achieved:

The number of freight cars per train increased from 33.4 in 1922 to 35.6 in 1923. The number of net tons per train increased from 512 to 552. The number of net tons per car increased from 23.9 to 24.8. The number of car miles per car day increased from 21.8 to 25.1. The number of net ton miles per train hour increased from 6,025 to 6,469. The amount of coal used per thousand gross ton miles decreased from 177 pounds to 167 pounds.

During the previous year, on account of the strike and disturbed conditions, the equipment was scattered and operating conditions more or less disorganized. Recovery from these adverse conditions, together with extraordinary efforts to avoid possibilities of car shortage and congestion on account of the extraordinary volume of traffic, necessitated increased handling of empty cars and prevented realization to the fullest extent of some economies that might otherwise have been brought about.

The maintenance expenditures during the year were high. Your company found it necessary to increase its maintenance of way expenditures considerably to take care of the replacement of a part of the two million untreated soft wood ties placed in the track in the years 1918 and 1919, during Federal Control. A number of facilities were replaced with improved facilities, and this occasioned heavy charges to operating expenses on account of retirements.

Equipment maintenance was much higher than usual because of the condition of the equipment at the end of the shop strike of the year previous. The unusual number of heavy repairs to locomotives added greatly to the cost of maintenance. At the end of the year the motive power of your company was in excellent condition, on the whole better than it had been for many years. The condition of cars presents a similar situation. A large number of cars requiring heavy repairs had accumulated during the strike and had to be taken care of. The passenger equipment likewise contributed its share to enlarge the expenditures. On the whole the equipment and road is in very good condition.

COST OF LABOR

No wage reductions were made during the year. A number of small increases were made to certain classes of employes. The total amount of wages included in operating expenses during the year was $79,299,689. This is comparable with $71,467,653 included in the year 1922. At the end of the year the number of employes was 43,208. This is comparable with 48,564 for the year 1922.

PENSIONS

During the year 169 employes were retired from service by the company and granted pensions. Of these retirements, 79 were on account of employes having reached the age of 70, and 90 were on account of employes having suffered permanent physical disabilities.

On December 31, 1923, there were 1,287 retired employes receiving pensions. The average monthly pension in force on that date was $36.51. The amount paid in pensions during the year was $538,105.72.

Since January 1, 1901, the effective date of the Pension System, the company's pension payments total $5,274,462.39.

FEDERAL VALUATION

The Interstate Commerce Commission is continuing the work of valuation of the property. No new reports of any kind relating to your property were issued during the year, but the Bureau of Valuation is continuing its work on these matters and your company is continuing to cooperate with the forces of the Commission in perfecting the inventories and furnishing the data and information called for and required by the Commission. During the year 1923, $189,974.49 was expended by the company on this work. This is $21,362.45 less than was expended the year before. From the commencement of this work up to December 31, 1923, $2,536,167.50 has been expended.

CONSTRUCTION AND MAINTENANCE DURING THE YEAR

Milwaukee, Wisconsin—Grade Separation on Madison Division.—Reference was made in the last annual report to the work being done on the elimination of grade crossings in the southwest part of the City of Milwaukee on the Madison Division, in conformity with provisions of an order of the Wisconsin Railroad Commission and an ordinance of the City of Milwaukee. This work was practically completed during the year. There were two tracks in this territory before the grade separation work was started. Provision has been made for four tracks. Three of these tracks are now in operation. The fourth track will not be built until additional train service requires it. When that time comes the additional track can be provided at relatively small expense. Grades on this part of the line were formerly 1%. They have been reduced to .5 of 1%. This has permitted an increase in westbound tonnage of 600 tons per train and has made possible the elimination of pusher engine service through this territory.

Clinton, Iowa.—The work of grade separation was carried on during the year and the subway at Second Street was completed. There remains an interlocking plant to be constructed in order to complete this project in its entirety. This plant will be built in 1924.

Ironwood, Michigan.—Reference was made in the last annual report to the construction of a viaduct across the yards and tracks at Mansfield Street. This viaduct was completed during the year and is now in service.

Chicago, Illinois—Kinzie Street Track Elevation.—The City Council of the City of Chicago ordered the separation of grades on the Galena Division along Kinzie Street, between Ashland Avenue and Sangamon Street, under an ordinance which expired at the close of the year 1921. Negotiations were entered into with the city for an extension of time. This was granted and tracks have been raised for a quarter of a mile and a subway has been provided at Ogden Avenue. Work was commenced in August, 1923, and substantial progress was made. It will be entirely completed early in 1924.

Casper, Wyoming.—A ten-stall addition to the engine house, of brick, an 80,000-gallon fuel oil tank, a forty-foot one hundred ton track scale, and a one-story brick storehouse and oil-house 36 feet by 120 feet, were constructed at this point; 5,400 feet of main line was relocated and nine miles of

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additional yard tracks constructed, providing additional yard capacity of 770 cars.

Chadron, Nebraska.—Eight stalls of the engine house were extended 26 feet, the machine shop was enlarged and a new 95-foot turntable was constructed.

Madison, Wisconsin—Monona Yard.—A 29-stall engine house, with a 50-foot by 100-foot machine shop, and a separate power house building and store house, were constructed of brick at this point. A 300-ton coaling station, of reinforced concrete, a 50,000-gallon steel water tank, and a car repair yard, were constructed at this location. This provides a complete new engine terminal at this point and the old terminal, near the station in Madison, has been abandoned and will be removed.

Milwaukee, Wisconsin.—A 300-ton coaling station, of reinforced concrete, was completed at this point.

Chicago Shops.—Two 600-ton coaling stations, of reinforced concrete, were constructed, one for the Galena Division and one for the Wisconsin Division.

Stambaugh, Michigan.—A 150-ton reinforced concrete coaling station was constructed.

Evansville, Wisconsin.—A 200-ton reinforced concrete coaling station was constructed.

Antoine, Michigan.—A 150-ton mechanically operated coaling station, of timber construction, was built.

Waseca, Minnesota.—A 150-ton mechanically operated coaling station, of timber construction, was built.

Huron, South Dakota.—A 200-ton mechanically operated coaling station, of timber construction, was completed during the year.

Onawa, Mondamin, Hawarden, Peterson and Laurens, Iowa, and Montfort Junction, Wisconsin.—Modern plants for chemical treatment and softening of water for locomotives were constructed at each of these locations. Very substantial economies will result from these improvements.

West Chicago, Illinois.—A well 2,080 feet deep, 20 inches in diameter at the top and 12 inches at the bottom, was sunk. An abundant supply of excellent water was obtained. This well will be equipped with an automatic air lift pumping device, capable of pumping 600 gallons per minute.

Malta, Illinois.—A well 1,011 feet deep, 16 inches in diameter at the top and 10 inches in diameter at the bottom, was sunk at this point.

Ravenswood, Illinois.—A third unit, consisting of a four-story concrete and brick fireproof building, 60 feet by 150 feet, was completed at this point, to provide additional space needed for storage of records and necessary room for the Accounting Department.

New London, Monico, Eagle River and Elcho, Wis., and Marenisco, Mich.—New station buildings were constructed at each of these points to replace buildings destroyed by fire.

Lake View and Story City, Iowa.—New station buildings of frame construction, with stucco exterior, were constructed at these points to replace old buildings which had become inadequate.

Asbestos, Illinois.—A new station, located opposite the recently erected plant of the Johns-Manville Company, about two miles north of Waukegan, was established during the year and given the name of Asbestos. The station building is of timber construction and finished with composition building material manufactured by the Johns-Manville Company.

Blair, Nebraska.—The superstructure of the bridge over the Missouri River at this point was, during the year, replaced by a new structure. The old bridge, one of the earliest built across this river, was constructed in 1882 and 1883. It was not of sufficient strength to carry the present day heavy locomotives and all trains had to be divided into smaller units before crossing the river. This caused delay and excessive operating expense. With the volume of traffic which your company now has to handle in this territory it was found that it would be economical to install a heavier superstructure.

The substructure supporting the bridge consisted of four main piers built of masonry in which Mankato limestone of superior grade was used. A careful examination was made and no signs of deterioration were found so that it was possible to use these piers without any changes or alterations.

The old bridge contained 2,389,018 pounds of metal in the three main spans and 374,098 pounds in the two approach spans. The new structure contains 4,563,500 pounds of metal in the three main spans and 559,000 pounds in the girder approaches. The new bridge is a single track bridge.

Radnor, Illinois.—A second track, extending from Radnor to Limestone, on the Southern Illinois Division, approximately seven miles in length, was constructed and put in operation. The construction of this track will admit of more rapid movement of trains over this division, thereby reducing the cost of operation materially.

Proviso Yard, West Chicago, Illinois.—The work of changing the location of the main tracks through the Proviso Yard from their present location in the middle of the yard to a new location on the south side of the yard has been commenced, and a third track from Elmhurst at the west end of this yard to West Chicago has also been started. These improvements are necessary in order to handle expeditiously the greatly increased volume of traffic moving in and out of this yard in the most economical manner and for the avoidance of delays.

Wyoming Division.—For the purpose of increasing train loads between Casper and Chadron, grades were reduced at Fetterman, Irvine, Careyhurst, Big Muddy, Strouds and Harrison. Grades were formerly slightly in excess of 1% at these points. They have been reduced to .6 of 1%. The curvature at Fetterman was also lightened. These grade changes permit the hauling of 50% more tonnage with the same locomotive power. Passing tracks for the accommodation of 60 cars were constructed at Casper, Siding No. 12, Crawford, Glen, Fort Robinson, Andrews, Harrison, Jireh, Siding No. 23, Siding No. 42, Fetterman, Irvine, Glen Rock and Big Muddy. Bridges between Chadron and Casper were strengthened to make them capable of carrying Mikado engines. With these improvements these engines may now be operated in this territory and 60-car trains operated where 20-car trains were the maximum that could be handled heretofore. Very great economies of operation are already being realized as a result of these improvements. The helper engine headquarters for the hill west of Harrison was moved from Douglas to Orin, and a two-stall engine house, with water and fuel oil stations, were provided for the helper engines, which will hereafter be stationed at this point.

Black Hills Division.—Passing tracks on the line between Dakota Junction and Rapid City were constructed at Dakota Junction, Oelrichs and Oral. Bridges on this line were also strengthened for the purpose of carrying Mikado engines. Thirty-car trains are now being operated in this territory, where 12-car trains were the maximum heretofore possible.

MILES OF RAILROAD

The total number of miles of railroad owned December 31, 1923, was		8,387.57 miles
In addition to which the Company operated under Trackage Rights:		
In the City of Peoria, Illinois (Peoria & Pekin Union Railway)	2.02 miles	
Churchill to Ladd, Illinois (New York Central Railroad)	2.80 "	
Broadway Station, Council Bluffs, Iowa, to South Omaha, Nebraska (Union Pacific Railroad)	8.73 "	
Blair to Omaha, Nebraska	24.70 "	
Elroy to Wyeville, Wisconsin	22.79 "	
In Sioux City, Iowa (Chicago, St. Paul, Minneapolis and Omaha Railway)	2.28 "	
Sioux City to Wren, Iowa (Illinois Central Railroad)	11.64 "	
		74.96 "
Total Miles of Railroad Operated December 31, 1923		8,462.53 miles

FREIGHT TRAFFIC

The details of Freight Traffic for the year ending December 31, 1923, compared with the preceding year, were as follows:

	1922	1923	Increase Amount	Increase Per Cent.
Freight Revenue	$100,700,614.03	$113,092,825.75	$12,392,211.72	12.31

	1922	1923	Percentage of Increase or Decrease
Tons of Revenue Freight Carried	48,607,124	58,207,915	19.75 Inc.
Tons of Revenue Freight Carried One Mile	7,579,553,676	9,248,615,383	22.02 Inc.
Average Revenue Received per Ton	$2.07173	$1.94291	6.22 Dec.
Average Revenue Received per Ton per Mile	1.329 cents	1.223 cents	7.98 Dec.
Average Distance Each Revenue Ton was Hauled	155.94 miles	158.89 miles	1.89 Inc.
Mileage of Freight and Proportion of Mixed Trains	17,609,129	20,282,667	15.18 Inc.
Average Number of Tons of Revenue and Non-revenue Freight Carried per Train Mile	510.52	548.71	7.48 Inc.
Average Number of Tons of Revenue and Non-revenue Freight Carried per Loaded Car Mile	23.81	24.64	3.49 Inc.
Average Freight Revenue per Train Mile	$5.72	$5.58	2.45 Dec.

PASSENGER TRAFFIC

The details of Passenger Traffic for the year ending December 31, 1923, compared with the preceding year, were as follows:

	1922	1923	Increase Amount	Increase Per Cent.
Passenger Revenue	$29,177,833.94	$30,390,660.14	$1,212,826.20	4.16

	1922	1923	Percentage of Increase or Decrease
Revenue Passengers Carried	33,826,207	33,004,205	2.44 Dec.
Revenue Passengers Carried One Mile	1,078,240,761	1,122,116,027	4.07 Inc.
Average Fare Paid per Passenger	86.253 cents	92.081 cents	6.76 Inc.
Average Rate Paid per Passenger per Mile	2.706 cents	2.708 cents	.07 Inc.
Average Distance Traveled per Revenue Passenger	31.87 miles	34.00 miles	6.68 Inc.
Mileage of Passenger and Proportion of Mixed Trains	17,933,057	18,904,478	5.42 Inc.
Average Passenger-train Revenue per Train Mile	$2.23	$2.19	1.79 Dec.

MAINTENANCE OF WAY AND STRUCTURES

The total Operating Expenses of the Company, for the year ending December 31, 1923, were $132,507,531.40; of this amount $23,368,263.78 was for charges pertaining to the Maintenance of Way and Structures. Included in these charges is a large part of the cost of 66,611 tons of steel rails, the greater portion of which was laid in replacement of rails of lighter weight in 510.94 miles of track; also the cost of 3,224,841 new track ties.

The charges for Maintenance of Way and Structures also include a portion of the cost of ballasting 92.59 miles of track with gravel, and 9.85 miles with cinders; the erection, in place of wooden structures, of 8 new steel bridges on masonry, and 10 on pile supports, aggregating 1,721 feet in length and containing 950 tons of bridge metal; and the replacement of other wooden structures with masonry arch and box culverts and cast-iron pipes, the openings being filled with earth. The length of wooden structures replaced by permanent work aggregates 8,717 feet.

The charges on account of Maintenance of Way and Structures for the year ending December 31, 1923, compared with the preceding year, were as follows:

	1922	1923	Increase
Cost of Rails:			
New steel rails	$1,235,163.69	$1,424,391.44	$189,227.75
Usable and rerolled rails	785,559.19	1,048,307.24	262,748.05
	$2,020,722.88	$2,472,698.68	$451,975.80
Less credit for old rails and other items	1,553,774.55	1,726,610.29	172,835.74
Net charge for rails	$466,948.33	$746,088.39	$279,140.06
Cost of Ties	3,328,842.74	3,807,268.63	478,425.89
Cost of Ballast	147,717.66	343,599.60	195,881.94
Cost of Other Track Material	886,166.03	1,077,952.05	191,786.02
Forwarded	$4,829,674.76	$5,974,908.67	$1,145,233.91
Roadway and Track Labor and Other Expenses	8,358,660.01	9,808,897.29	1,450,237.28
Total Charges for Roadway and Track	$13,188,334.77	$15,783,805.96	$2,595,471.19

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Other Charges Account Maintenance of Way and Structures were as follows:

Bridges, Trestles and Culverts	1,219,065.10	1,477,391.66	258,326.56
Road Crossings, Fences, Etc.	633,274.34	798,963.89	165,689.55
Signals and Interlockers	737,256.05	829,624.63	92,368.58
Buildings, Fixtures and Grounds	1,664,135.67	2,368,835.57	704,699.90
Wharves and Docks	98,442.33	162,479.41	64,037.08
Superintendence	917,657.35	1,009,395.84	91,738.49
Roadway Tools and Supplies	407,101.04	457,523.73	50,422.69
Sundry Miscellaneous Charges	458,616.07	480,243.09	21,627.02
Total Charges Account Maintenance of Way and Structures	$19,323,882.72	$23,368,263.79	$4,044,381.06

The above charges for Maintenance of Way and Structures for the current year amount to 17.64 per cent. of the total Operating Expenses, as compared with 16.21 per cent for the preceding year.

Maintenance of Equipment

The charges on account of Maintenance of Equipment for the year ending December 31, 1923, compared with the preceding year, were as follows:

	1922	1923	Increase or Decrease
Locomotives	$12,179,564.47	$15,551,616.09	$3,372,051.62 Inc.
Passenger-train Cars	2,416,298.74	2,806,085.45	389,786.71 Inc.
Freight-train Cars	12,048,150.51	15,169,957.40	3,121,806.89 Inc.
Work Equipment	346,915.14	517,697.70	170,782.56 Inc.
Shop Machinery	278,630.92	527,442.75	248,811.83 Inc.
Superintendence	937,504.78	1,042,231.12	104,726.34 Inc.
Sundry Miscellaneous Charges	2,249,005.63	305,031.24	1,943,974.39 Dec.
Total Charges Account Maintenance of Equipment	$30,456,070.19	$35,920,061.75	$5,463,991.56 Inc.

The above charges for Maintenance of Equipment for the current year amount to 27.11 per cent. of the total Operating Expenses, as compared with 25.55 per cent. for the preceding year.

Transportation Expenses

The charges on account of Transportation Expenses for the year ending December 31, 1923, compared with the preceding year, were as follows:

	1922	1923	Increase or Decrease
Labor	$40,153,337.86	$43,400,937.14	$3,247,599.28 Inc.
Fuel for Locomotives	14,604,335.15	14,241,853.23	362,481.92 Dec.
Supplies and Miscellaneous Items	8,299,045.15	8,865,820.21	566,775.06 Inc.
Total Charges Account Transportation Expenses	$63,056,718.16	$66,508,610.58	$3,451,892.42 Inc.

The above charges for Transportation Expenses for the current year amount to 50.19 per cent. of the total Operating Expenses, as compared with 52.90 per cent. for the preceding year.

Capital Stock

There was no change during the year in the Capital Stock and Scrip of the Company other than the purchase, by the Company, of $300.00 Common Stock Scrip.

The Capital Stock authorized by the Company is Two Hundred Million Dollars ($200,000,000.00), of which the following has been issued to December 31, 1923:

Held by the Public:		
Common Stock and Scrip	$145,156,343.82	
Preferred Stock and Script	22,395,120.00	
Special Stock	25,000.00	
Total Stock and Scrip held by the Public		$167,576,463.82
Held in Treasury:		
Common Stock and Scrip	$2,343,297.15	
Preferred Stock and Scrip	3,834.56	
Total Stock and Scrip held in Treasury		2,347,131.71
Total Capital Stock and Scrip, December 31, 1923		$169,923,595.53

Funded Debt

At the close of the preceding year the amount of Funded Debt held by the Public was $235,516,700.00

The above amount has been decreased during the year ending December 31, 1923, by Bonds and Equipment Trust Certificates redeemed, as follows:

M. L. S. & W. Ry. Extension and Improvement Sinking Fund Mortgage, 5%	$83,000.00	
Forwarded	$83,000.00	$235,516,700.00
C. & N. W. Ry. Sinking Fund of 1879, 5%	57,000.00	
C. & N. W. Ry. Sinking Fund Debentures of 1923, 5%	114,000.00	
Boyer Valley Ry. First Mortgage, 3½% (including $1,000.000 unpresented and transferred to "Current Liabilities")	1,440,000.00	
C. & N. W. Ry. Equipment Trust Certificates of 1912, Series C, 4½% (including $2,000.00 unpresented and transferred to "Current Liabilities")	400,000.00	
C. & N. W. Ry. Equipment Gold Notes of 1920, 6%	664,900.00	
Total Funded Debt Redeemed		2,758,900.00
		$232,757,800.00

And the above amount has been increased by Bonds and Equipment Trust Certificates sold during the year ending December 31, 1923, as follows:

C. & N. W. Ry. General Mortgage Gold of 1987, 5%, sold to reimburse the Company for past expenditures made for construction and in redeeming underlying bonds	$2,233,000.00	
C. & N. W. Ry. First and Refunding Mortgage, 5%, sold to reimburse the Company for past expenditures made for construction and in redeeming underlying bonds	15,250,000.00	
C. & N. W. Ry. Equipment Trust Certificates of 1922, 5% (secured by Series M and N equipment of the Equipment Trust of 1922):		
Series M	$5,175,000.00	
Series N	4,755,000.00	
	9,930,000.00	
		27,413,000.00
Leaving Funded Debt held by the Public, December 31, 1923		$260,170,800.00

Bonds in the Treasury and Due from Trustee

At the close of the preceding year the amount of the Company's unpledged Bonds and Equipment Trust Certificates in the Treasury and Due from Trustee was $16,890,000.00

The above amount has been increased during the year ending December 31, 1923, as follows:

C. & N. W. Ry. General Mortgage Gold Bonds of 1987, received, or due from Trustee, in exchange for Bonds redeemed during the year		2,000.00
Other bonds redeemed during the year exchangeable for C. & N. W. Ry. General Mortgage Gold Bonds of 1987, viz.:		
M. L. S. & W. Ry. Extension and Improvement Sinking Fund Mortgage, 5%	$81,000.00	
C. & N. W. Ry. Sinking Fund of 1879, 5%	57,000.00	
C. & N. W. Ry. Sinking Fund Debentures of 1933, 5%	114,000.00	
		252,000.00
C. & N. W. Ry. General Mortgage Gold Bonds of 1987, due from Trustee on account of Construction Expenditures made during the year		1,000,000.00
C. & N. W. Ry. Equipment Trust Certificates of 1923, 5%, Series O issued		6,180,000.00
C. & N. W. Ry. First and Refunding Mortgage, 5%, received from Trustee, as follows:		
Account Construction Expenditures	$13,837,000.00	
In exchange for Boyer Valley Ry. First Mortgage Bonds retired	1,440,000.00	
		15,277,000.00
Forwarded		$39,601,000.00

And the above amount has been decreased during the year ending December 31, 1923, as follows:

C. & N. W. Ry. First and Refunding Mortgage, 5%, sold to reimburse the Company for past expenditures made for construction and in redeeming underlying bonds	$15,250,000.00	
C. & N. W. Ry. General Mortgage Gold Bonds of 1987, 5%, sold to reimburse the Company for past expenditures made for construction and in redeeming underlying bonds	2,233,000.00	
C. & N. W. Ry. Equipment Trust Certificates of 1913, 4½%, matured and cancelled:		
Series D	400,000.00	
Series E	485,000.00	
Series F	115,000.00	
C. & N. W. Ry. Equipment Trust Certificates of 1917, 5%, matured and cancelled:		
Series G	422,000.00	
Series H	400,000.00	
Series I	178,000.00	
C. & N. W. Ry. Equipment Trust Certificates of 1920, 6½%, matured and cancelled:		
Series L	187,000.00	
		19,670,000.00
Total Bonds in the Treasury and due from Trustee December 31, 1923, unpledged		$19,931,000.00

The following bonds owned by the Company are pledged as security for the C. & N. W. Ry. 10-Year Secured Gold Bonds and C. & N. W. Ry. 15-Year Secured Gold Bonds:

C. & N. W. Ry. General Mortgage Gold of 1987, 5%	$20,500,000.00
C. & N. W. Ry. First and Refunding Mortgage, 6%	15,000,000.00
Total December 31, 1923, pledged	$35,500,000.00

LANDS

During the year ending December 31, 1923, 7,048.86 acres and 3 town lots of the Company's Land Grant lands were sold for the total consideration of $197,946.20. The number of acres remaining in the several Grants December 31, 1923, amounted to 229,522.42 acres, of which 17,869.41 acres were under contract for sale, leaving unsold 211,653.01 acres.

The Board announces, with sorrow, the loss by death during the year of two of its members, Mr. Edmund D. Hulbert, who served as a Director from February 26, 1918, and as a member of the Executive Committee from April 19, 1921, to the time of his death on March 30, 1923, and Mr. David P. Kimball, who served as a Director from March 27, 1884, and as member of the Executive Committee from January 4, 1885, to the time of his death on August 7, 1923.

Acknowledgment is made to all officers and employes of their loyal and efficient cooperation and service.

Appended hereto may be found statements, accounts and statistics relating to the business of the fiscal year and the condition of the Company's affairs on December 31, 1923.

By order of the Board of Directors.

W. H. FINLEY, President.

Chicago, May 14, 1924.

[Advertisement]

Forty-second Annual Report of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company

To the Stockholders of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company:

The Board of Directors submits herewith its report of the affairs of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company for the year ended December 31, 1923.

OPERATING REVENUES:		
Freight	$20,074,017.19	
Passenger	6,110,998.64	
Other Transportation	1,809,801.82	
Incidental	368,416.61	
Total Operating Revenues		$28,363,234.26
OPERATING EXPENSES (82.91 per cent. of Operating Revenues)		23,516,147.37
Net Revenue from Railway Operations		$4,847,086.89
RAILWAY TAX ACCRUALS (5.64 per cent. of Operating Revenues)	$1,598,503.23	
UNCOLLECTIBLE RAILWAY REVENUES	12,202.66	1,610,705.89
Railway Operating Income		$3,236,381.00
NET RENTAL DEDUCTIONS		207,465.90
Net Railway Operating Income, forwarded		$3,028,915.10
NONOPERATING INCOME:		
Dividend Income	$37,489.43	
Income from Funded Securities	7,143.94	
Income from Unfunded Securities and Accounts, and other items	193,072.95	
Total Nonoperating Income		237,706.32
Gross Income		$3,266,621.42
DEDUCTIONS FROM GROSS INCOME:		
Interest on Funded Debt	$2,602,156.34	
Other Deductions	40,292.09	
Total Deductions from Gross Income		2,642,448.43
Net Income		$624,172.99
DISPOSITION OF NET INCOME:		
Dividends—		
7% on Preferred Stock	$788,151.00	
2½% on Common Stock	463,917.50	1,252,068.50
Balance Loss for the year		$627,895.51

GENERAL REMARKS

BUSINESS CONDITIONS AND TRAFFIC

During the year your Company carried 1,612,951,567 tons of freight one mile. This is 9.05 per cent. more than was carried in 1922. Freight revenue earnings amounted to $20,074,017.19, being $471,322.83 or 2.4 per cent. more than the year before.

There was practically no change in the amount of revenue earned from passenger traffic. The amount was $6,110,998.64 in 1923 and $6,110,337.40 in 1922.

The total of all revenue received was $28,363,234.26. This was $562,227.20 or 2.02 per cent. more than was received in 1922. It is obvious that the increase in revenue was by no means commensurate with the increase in volume of traffic carried. Several reasons exist for this. About 40 per cent. of the freight tonnage handled by your Company consists of the products of agriculture. A large proportion of commodities other than the products of agriculture that your Company handles is destined for consumption on the farm or in ways where the amount that will be used is chiefly determined by the condition of agriculture. The business of your Company has therefore been seriously affected by the depressed condition that has prevailed in the agricultural region of the Northwest during the past three years. Coupled with this condition in its effect upon the earnings of your Company is that resulting from the lowering of freight rates in 1922. Heavier reductions were made in the rates on grain and grain products than on other classes of freight. The lowering of freight rates caused a loss of freight revenue to your Company on the volume of business done in 1923 of approximately $2,692,000. Freight rates are now about 55 per cent. higher than they were in 1915 and 1916. Wages of employees are 100 per cent. higher and the materials and supplies cost approximately 60 per cent. more than in those years. While there was an increase in the total amount of freight handled, which is shown by an increase in the number of carloads of 12.49 per cent. and 9.05 per cent. in the number of tons carried one mile, the major portion of the increase came from the increased movement of those commodities which take the lowest average rates.

There was an increase of 5.47 per cent. in the number of cars of agricultural products handled during the year compared with the number of cars handled during the preceding year.

There was an increase of 13.88 per cent. in the number of cars of live stock handled, but the revenue received increased only $237,658.89, or 10.22 per cent. Included under this heading was an increase of 32.97 per cent. in the number of cars of hogs handled.

In the case of bituminous coal there was a decrease of 18.29 per cent. in the number of cars handled, resulting in a loss in revenue of $566,902.73, or nearly 30 per cent.

There was an increase of 44.43 per cent. in the number of cars of forest products. This is a kind of traffic which is carried under a very low rate.

The number of cars per train was increased from 27.1 to 29.0. Gross tons per train increased 4.54 per cent. Train speed increased .87 per cent. Average movement of freight cars per day was increased 17.62 per cent.

The average price per ton of fuel during the year was $5.21. This is comparable with $5.44 during the preceding year. On account of increased train movement necessary to handle the greater volume of traffic 49,936 tons more fuel was used and the operating expenses were thereby increased approximately $93,000.

CONSTRUCTION AND MAINTENANCE DURING THE YEAR 1923

As in the preceding year, construction expenditures were confined almost entirely to Additions and Betterments incidental to renewal work, and expenditures made upon the order of some state authority. The following were the principal items of work carried out during the year:

Jim Falls, Wisconsin.—The change of line 1.6 miles long, north of Jim Falls, which was mentioned in the preceding report, was completed and placed in operation April 16, 1923. Made necessary on account of the construction of a large dam on the Chippewa River by the Chippewa Power Company, the new line which is of practically the same length as that abondoned, is of better construction and more favorably located. The work was done at the expense of the Power Company, under direction of our Engineering Department.

St. Paul, Minnesota.—In accordance with an ordinance of the City Council, the grade crossing at White Bear Avenue was replaced with an overhead bridge of steel construction supported on concrete piers and abutments. It was opened for service November 9, 1923.

Tekamah, Nebraska.—The freight and passenger station which was destroyed by fire was replaced with a fireproof station 24 ft. by 124 ft., equipped with hot water heat. A brick platform 300 ft. long with concrete curb was constructed.

Benoit, Wisconsin.—In accordance with an order of the Railroad Commission of Wisconsin a combination freight and passenger station of fireproof construction 16 ft. by 46 ft., equipped with hot water heat, was constructed.

Merrillan, Wisconsin.—In accordance with an order of the Railroad Commission of Wisconsin the passenger station was remodeled, increased in size by additions to the two waiting rooms, and equipped with hot water heat. A covered runway 14 ft. by 28 ft., a baggage room 20 ft. by 20 ft., and a brick platform 12 ft. by 20 ft., were also added.

Spooner, Wisconsin.—Eight modern stalls were added to the enginehouse, replacing the facilities destroyed by fire in 1922, five of them being 100 ft. long and the three containing drop pits being 118 ft. long. Walls are of brick and the building is equipped with steam heat.

Emerson, Nebraska.—A 150 ton Ogle Coaling Station, concrete foundation on piling, timber superstructure, 1¼ ton bucket and loader, with hoisting capacity of 38 tons per hour, was constructed to replace the facilities destroyed by fire during 1922.

Track Scales.—The track scales at Marshfield, Wisconsin, and Sioux Falls, South Dakota, were replaced with 50 ft., 125 ton Strait and Fairbanks scales, respectively.

Water Tanks.—Water tanks, consisting of wooden tubs on steel towers and concrete foundations, were erected at New Richmond and Cable, Wisconsin, Le Sueur, Minnesota, and Pender, Nebraska, replacing tanks worn out except at Cable, Wisconsin, where the tank was destroyed by fire. At Le Mars, Iowa, two treating tanks were similarly replaced.

During the year the following important bridges were constructed:

Deer Park, Wisconsin.—Bridge 34. A 7 span pile bridge 92 ft. long was replaced with a 35 ft. deck plate girder on concrete abutments.

Minneopa, Minnesota.—Bridge 424. A 6 span pile bridge, 90 ft. long was replaced with a 4 span I-beam bridge 85 ft. long on pile piers and bents.

Sheldon, Iowa.—Bridge 728. A 14 span pile bridge 190 ft. long was replaced with three 40 ft. deck plate girder spans on concrete piers and abutments.

Blair, Nebraska.—Bridge 213. An 8 span pile bridge was replaced with a 50 ft. deck plate girder on pile piers and bents, eliminating 42 ft. of pile bridge.

Florence, Nebraska.—Bridge 282. A 4 span pile bridge was replaced with a 60 ft. through plate girder span on pile piers and bents, eliminating 43 ft. of pile bridge.

CAPITAL STOCK

There has been no change since the close of the preceding year in the Capital Stock and Scrip of the Company.

The Company's authorized Capital Stock is Fifty Million Dollars ($50,000,000), of which the following has been issued to December 31, 1923:

OUTSTANDING:		
Common Stock and Scrip	$18,559,086.69	
Preferred Stock and Scrip	11,259,859.09	
		$29,818,945.73
OWNED BY THE COMPANY:		
Common Stock and Scrip	$2,844,206.64	
Preferred Stock and Scrip	1,386,974.20	
		4,231,180.84
Total Capital Stock and Scrip, December 31, 1923		$34,050,126.62

FUNDED DEBT

At the close of the preceding year the amount of Funded Debt, was		$47,434,400.00
The above amount has been decreased during the year ended December 31, 1923, by Equipment Trust Certificates redeemed, as follows:		
Chicago, Saint Paul, Minneapolis and Omaha Railway Equipment Gold Notes, 6%, redeemed	$156,800.00	
Chicago, Saint Paul, Minneapolis and Omaha Railway Equipment Trust Certificates of 1917, Series "A," 7%, redeemed	110,000.00	
		266,800.00
Leaving Funded Debt Outstanding, December 31, 1923		$47,167,600.00

In addition to the foregoing transactions, Chicago, Saint Paul, Minneapolis and Omaha Railway Consolidated Mortgage 6 per cent. Bonds of 1880 were issued in exchange for the following underlying bonds:

North Wisconsin Railway First Mortgage of 1880, 6%	$9,000.00

LANDS

During the year ended December 31, 1923, 1,279.96 acres of the Company's Land Grant lands were sold for the total consideration of $11,343.36. The number of acres remaining in the several Grants December 31, 1923, amounted to 60,437.46 acres, of which 9,519.44 acres were under contract for sale, leaving unsold 50,918.02 acres.

The Board announces with sorrow the death on August 7, 1923, of Mr. David P. Kimball, who served as a Director and as a member of the Executive Committee from June 4, 1887, to the time of his death.

Appreciation is expressed to all officers and employees for their loyalty and full support, their interest in the affairs of the Company, and their endeavors to bring about improvement of the service.

Appended hereto may be found Statements and Accounts relating to the business of the Company for the year, and the condition of its affairs on December 31, 1923.

By order of the Board of Directors.

W. H. FINLEY, President.

Chicago, Illinois, May 14, 1924.

[ADVERTISEMENT]

Thirtieth Annual Report of Southern Railway Company

RICHMOND, VA., June 30th, 1924.

To the Stockholders of Southern Railway Company:

The Board of Directors submits the following report of the affairs of the Company for the year ended December 31, 1923:

INCOME ACCOUNT.

The income account for the year 1923 was published on February 14, 1924. It shows a balance of $15,136,998 over fixed charges compared with $8,823,796 in 1922. The operating income is equivalent to 4.73% on the investment.

OPERATIONS.

The gross revenue amounted to $150,467,985, an increase of 17% over the preceding year.

The volume of revenue freight traffic, 8,123 million ton miles, an increase of 24.73% over the 6,513 million ton miles in 1922, approximated the high record of 8,230 million ton miles reached in 1920. Freight of every kind played a part in this expansion. All of the seventy classes into which the traffic is divided for statistical purposes showed increases except seven relatively unimportant items. With an increase of 24.73% in ton miles (the revenue unit), the increase in freight train miles (the expense unit) was limited to 19.60%. This was possible by reason of an increase of 8.08% in the average train load. The average revenue per ton mile was 1.298c, a decline of 15.22% from the average of 1921.

From passenger traffic the revenue increased 11.54%, although there was no substantial change in the number of passengers carried and the rate of fare was not increased. The explanation is found in the longer average journey of 65.92 miles against 59.89 miles, an increase of 10.07%. The railroad enjoyed in full measure the expansion of long distance travel which comes with a year of business activity and individual prosperity, but continued to experience the loss of local travel to the automobile. In that connection it may be noted, however, that 180,329 tons of automobiles were hauled as freight in 1923 compared with 75,386 tons in 1922 and 58,133 tons in 1921. With an increase of 11.46% in passenger miles, passenger train miles increased only 3.07%, the average number of passengers per train being 8.14% greater.

From express traffic the railroad received $2,652,890, an increase of 25% over the preceding year.

The ratio of operating expenses to gross earnings was 74.71% compared with 75.62% in 1922. The increase in operating expenses amounted to $15,244,125, of which no less than $10,708,460 is accounted for by larger expenditures for maintaining the property. The increase in transportation expenses was $3,895,645. Out of each dollar of revenue 36.32c was required for transportation expenses compared with 39.50c in the preceding year, a decline of 8.05%. With an increase of 8.08% in the average freight train load and an increase of 8.14% in passengers carried per passenger train mile the transportation expense per train mile was reduced 3.10%.

Taxes continued to climb, reaching a total of $6,994,407, an increase of $1,230,718, or 21.35%, over 1922. These figures do not include the indirect tax imposed upon a railroad by public authorities for the provision of public improvements from which no revenue is derived.

DIVIDENDS.

On the preferred stock two semi-annual dividends totaling 5% were paid during the year. An initial quarterly dividend of 1¼% on the common stock was declared on March 13, 1924, and on June 12, 1924, the preferred stock also was placed upon a quarterly dividend basis.

PROPERTY INVESTMENT.

The proceeds from the sale in November, 1923, of $20,000,000 Development and General Mortgage bonds have been made available for the provision of additions and improvements to the plant under a program for the expenditure of the money during the years 1924 and 1925 for the enlargement of yard, shop and freight station facilities, additional tracks and grade improvements.

Twenty-five new locomotives, 3,500 new freight cars and 45 new passenger train cars were contracted for early this year and are now in process of delivery. The cost of this equipment was $8,300,000, and the money was provided partly from current treasury funds and the remainder from the sale of $6,600,000 Series "Y" 5% equipment trust certificates dated March 1, 1924, payable in thirty equal semi-annual installments. The benefits to be derived from liberal expenditures for new engines and cars have been strikingly demonstrated by the results during the year under review. New and heavier power contributed largely to the handling of a greatly increased volume of traffic without congestion and at relatively lower unit costs of train operation. The net charge against the Company for hire of equipment came down from $4,213,019 in 1922 to $2,042,237 in 1923, notwithstanding an increase of 24.73% in freight ton miles and despite the necessary retiring of 8,757 old freight cars from service during the year.

INDUSTRIAL AND AGRICULTURAL DEVELOPMENT.

One hundred and ninety-six new industrial enterprises were established and 188 previously existing plants were enlarged in the territory served by Southern Railway System during the year 1923, classified as follows:

	New Plants	Enlargements
Textile	51	131
Lumber	36	8
Mines and Quarries	17	3
Building materials	12	4
Furniture	10	7
Iron and Steel	9	12
Flour and Feed	5	1
Miscellaneous	56	22
	196	188

The Southern textile industry continued during the year the remarkable growth which has marked its development in recent years. There was a net increase of 782,665 new spindles in the South. In states outside of the South there was a net decrease of 92,510 spindles. The temporary depression from which the textile industry as a whole is now suffering affords some striking statistics of the relatively fortunate position of the Southern mills. In the four months from January 1, 1924, to April 30, 1924, the mills of the South consumed more than twice as much cotton as did the other mills of the country. The amount of cotton used in manufacture in the South was 6.84% less than for the same four months of 1923. For the rest of the country this decrease was 36.03%.

Aside from the temporary ill effects of a backward planting and growing season, the generally improving tendency in agricultural conditions in the South continues. A better understanding of the problem of cotton raising under boll weevil conditions, as well as crop diversification and animal husbandry, is contributing to this improvement. The large fruit crops in prospect should find profitable markets.

The pace set by industry in 1923 has slowed down during the last few months in the South as elsewhere. Nevertheless, the recognition that fundamental conditions are sound holds forth the promise of a continuance of business activities at the prevailing level until consumption and demand again shall afford the needed impetus to the resumption of the forward stride.

To all officers and employees who have faithfully and efficiently performed their duties the thanks of the Board of Directors again are tendered.

Respectfully submitted, by order of the Board,

FAIRFAX HARRISON,
President.

TABLE 1.—INCOME STATEMENT.

	1923	1922
OPERATING REVENUES:		
Freight	$105,439,499.17	$88,091,271.82
Passenger	33,756,011.37	30,264,513.62
Miscellaneous Passenger-Train	1,111,905.67	1,011,274.09
Mail	2,985,727.24	2,895,131.29
Express	2,652,890.25	2,123,943.67
Other Transportation	1,375,232.42	1,382,463.59
Incidental	2,387,089.75	1,970,737.25
Joint Facility	759,629.36	750,511.78
TOTAL OPERATING REVENUES	$150,467,985.23	$128,489,847.11
OPERATING EXPENSES:		
Maintenance of Way and Structures	$20,680,325.55	$17,295,516.53
Maintenance of Equipment	29,251,199.43	21,927,548.14
Traffic	2,908,426.91	2,479,929.27
Transportation	54,649,659.19	50,784,013.50
Miscellaneous Operations	1,052,633.51	954,922.06
General	3,893,773.32	3,760,406.66
Transportation for Investment—Credit	*21,759.24*	*2,203.02*
TOTAL OPERATING EXPENSES	$112,414,258.67	$97,170,133.14
NET REVENUE FROM OPERATIONS	$38,053,726.56	$31,319,713.97
TAXES	$6,994,407.26	$5,763,689.46
UNCOLLECTIBLE REVENUES	47,388.42	89,821.17
HIRE OF EQUIPMENT	2,042,236.94	4,213,018.62
JOINT FACILITY RENTS	841,557.10	780,406.70
TOTAL OTHER EXPENSES	$9,925,589.72	$10,846,935.95
OPERATING INCOME	$28,128,136.84	$20,472,778.02
NON-OPERATING INCOME:		
Income from Lease of Road	$63,957.24	$62,096.62
Miscellaneous Rent Income	268,822.49	268,967.95
Miscellaneous Non-Operating Physical Property	133,728.20	108,587.05
Dividend Income	1,565,674.80	2,951,025.54
Income from Funded Securities	938,815.80	632,487.69
Income from Unfunded Securities and Accounts	612,285.51	463,806.02
Miscellaneous Income	882.69	*3,503.42*
TOTAL NON-OPERATING INCOME	$3,584,166.73	$4,483,467.45
TOTAL GROSS INCOME	$31,712,303.57	$24,956,245.47
DEDUCTIONS FROM TOTAL GROSS INCOME:		
Rent for Leased Roads	$2,656,961.82	$2,556,759.81
Miscellaneous Rents	31,285.86	36,142.15
Separately Operated Properties	543,124.06	528,304.93
Interest on Unfunded Debt	50,110.17	191,928.74
Miscellaneous Income Charges	158,654.97	177,552.26
TOTAL DEDUCTIONS OF THIS CLASS	$3,440,136.88	$3,490,687.89
TOTAL AVAILABLE INCOME	$28,272,166.69	$21,465,557.58
INTEREST ON FUNDED DEBT	$11,665,046.67	$11,629,788.98
INTEREST ON EQUIPMENT OBLIGATIONS	1,244,113.80	785,964.00
DIVIDEND ON SOUTHERN RAILWAY—MOBILE AND OHIO STOCK TRUST CERTIFICATES	226,008.00	226,008.00
TOTAL DEDUCTIONS OF THIS CLASS	$13,135,168.47	$12,641,760.98
BALANCE OF INCOME OVER CHARGES	$15,136,998.22	$8,823,796.60
DIVIDEND ON PREFERRED STOCK	3,000,000.00	1,500,000.00
BALANCE CARRIED TO CREDIT OF PROFIT AND LOSS	$12,136,998.22	$7,323,796.60

TABLE 2.—PROFIT AND LOSS.

Credit Balance December 31, 1922		$60,061,352.70
Add:		
Credit Balance of Income for the Year	$12,136,998.22	
Net Miscellaneous Credits	153,147.49	
		12,290,145.71
		$72,351,498.41
Deduct:		
Property Retired	$193,390.51	
Discount on Securities Sold	1,845,307.14	
Securities and Accounts Written Off	1,613,403.64	
Appropriated for Nonproductive Capital Charges, required by Public Authorities	1,186,124.75	
		4,838,226.04
Credit Balance December 31, 1923		$67,513,272.37

[ADVERTISEMENT]

TABLE 3.—GENERAL BALANCE SHEET.

ASSETS.

	December 31, 1923.	December 31, 1922.
Investments:		
Investment in Road	$354,066,936.39	$351,338,736.06
Investment in Equipment	107,712,631.53	94,940,839.63
Total Investment in Road and Equipment	$461,779,567.92	$446,279,575.69
Funds Appropriated for Construction	$18,589,406.26	.....
Proceeds from sale of Mortgaged Property, held by Trustees for Reinvestment	684,147.31	$456,650.00
Miscellaneous Physical Property	1,010,020.05	1,005,461.82
Investments in Affiliated Companies:		
Stocks	$35,147,261.75	$35,224,658.76
Bonds	24,935,973.19	25,936,072.69
Notes	4,674,201.57	4,448,896.53
Advances	2,731,681.16	4,119,201.08
Total Investments in Affiliated Companies	$67,489,117.67	$69,728,829.06
Other Investments:		
Stocks	$93,808.00	$93,908.00
Bonds	2,429,003.21	2,643,913.45
Notes	120,892.79	193,836.02
Advances for Purchase of Additional Equipment	.....	5,921,846.50
Total Other Investments	$2,643,704.00	$8,853,503.97
Total Investments	$552,195,963.21	$526,324,020.54
Current Assets:		
Cash	$9,975,262.26	$14,158,943.26
United States Treasury Notes (Par Value $10,000 000)	9,984,187.51	.....
Special Deposits	2,824,975.40	2,885,448.80
Loans and Bills Receivable	34,967.92	29,152.61
Traffic and Car Service Balances Receivable	1,765,847.49	1,578,482.03
Balances due from Agents and Conductors	92,329.69	155,170.36
Miscellaneous Accounts Receivable	6,375,645.69	8,477,471.26
Material and Supplies (Table 11)	17,194,734.59	12,374,602.93
Interest and Dividends Receivable	632,555.55	1,052,518.06
Other Current Assets	256,119.08	438,664.63
Total Current Assets	$49,136,625.18	$41,150,453.94
Deferred Assets:		
Working Fund Advances	$72,402.43	$51,993.78
Cash and Securities in Insurance Fund	900,658.76	879,450.32
Cash Deposited under North Carolina Railroad Lease	175,000.00	175,000.00
Other Deferred Assets	172,823.67	74,065.40
Total Deferred Assets	$1,320,884.86	$1,180,509.50
Unadjusted Debits:		
Insurance Premiums and Rents paid in Advance	$4,836.52	$9,821.54
Discount on Funded Debt	.....	253,715.62
Additions and Betterments Expenditures: Freight Claims: Foreign Mileage and Sundry Items in Suspense	4,015,467.86	4,361,829.91
Total Unadjusted Debits	$4,020,304.38	$4,625,367.07
Securities of the Company held by it: 1923. 1922. Unpledged ...$31,171,200.00 $46,171,200.00		
Grand Totals	$606,673,777.63	$573,280,351.05

LIABILITIES.

	December 31, 1923.	December 31, 1922.
Capital Stock:		
Common	$120,000,000.00	$120,000,000.00
Preferred	60,000,000.00	60,000,000.00
Total Southern Railway Company Stock	$180,000,000.00	$180,000,000.00
Southern Ry.-Mobile & Ohio Stock Trust Certificates	$5,650,200.00	$5,650,200.00
Long Term Debt:		
Funded Debt (Table 4)	$259,213,500.00	$239,213,500.00
Equipment Trust Obligations (Table 5)	26,049,400.00	22,416,600.00
Total Long Term Debt	$285,262,900.00	$261,630,100.00
Total Capital Liabilities	$470,913,100.00	$447,280,300.00
Governmental Grants:		
Grants since July 1, 1914, in aid of Construction	$214,150.34	$214,550.34
Current Liabilities:		
Traffic and Car Service Balances Payable	$1,850,846.77	$2,137,152.80
Audited Accounts and Wages Payable	15,996,797.22	14,956,767.56
Miscellaneous Accounts Payable	1,515,220.49	1,545,733.42
Interest Matured, including interest due January 1st	2,794,118.60	2,816,452.50
Dividends Matured Unpaid	1,625.00	6,192.50
Funded Debt Matured Unpaid	29,581.80	62,833.80
Unmatured Dividends Accrued	56,502.00	56,502.00
Unmatured Interest Accrued	2,249,561.40	1,907,621.49
Unmatured Rents Accrued	311,153.49	323,947.33
Expenses Accrued not vouchered	2,058,378.57	1,736,242.59
Other Current Liabilities	1,470,943.78	1,348,646.36
Total Current Liabilities	$28,334,729.12	$26,898,092.35
Deferred Liabilities:		
Sundry Deferred Liabilities	$2,147,183.39	$1,614,778.08
Unadjusted Credits:		
Taxes	$2,465,064.11	$1,899,764.30
Insurance Reserve	1,300,658.76	1,279,450.32
Operating Reserves	1,199,542.16	1,339,825.61
Depreciation accrued on:		
Rail Leased to Other Companies	129,776.08	144,144.73
Equipment Owned	24,733,867.21	25,325,088.81
Equipment Leased from Other Companies	570,205.15	622,125.13
Sundry Items	4,111,933.14	4,769,753.08
Total Unadjusted Credits	$34,511,046.61	$35,380,151.98
Corporate Surplus:		
Additions to Property, since June 30, 1907, through Income and Surplus	$1,812,075.89	$1,809,532.42
Appropriated Surplus since January 1, 1921, for Nonproductive Capital Charges, required by Public Authorities	1,206,626.73	.....
Miscellaneous	21,593.18	21,593.18
Total Appropriated Surplus	$3,040,295.80	$1,831,125.60
Profit and Loss—Balance	$67,513,272.37	$60,061,352.70
Grand Totals	$606,673,777.63	$573,280,351.05

[Advertisement]

(*Continued from page 82*)

St. Louis Southwestern.—*Annual Report.*—The annual report issued this week shows a net income of $3,401,092 as compared with $2,256,679 in 1922. A selection of the principal items in the income account follows:

	1923	1922	Increase or Decrease
Average miles of road operated	1,776	1,776	.....
Freight revenue	$24,596,071	$22,297,232	$2,298,839
Passenger revenue	3,390,917	2,686,794	704,124
Total operating revenues	29,551,120	26,159,914	3,391,206
Maintenance of way and structures	4,251,897	4,299,557	—47,660
Maintenance of equipment	6,798,326	4,831,299	1,967,026
Traffic expenses	784,522	740,968	43,553
Transportation	8,984,543	9,091,602	—107,059
General	1,038,073	1,012,327	25,746
Total operating expenses	21,990,212	20,007,426	1,982,787
Net operating revenue	7,560,907	6,152,489	1,408,419
Railway tax accruals	1,630,624	1,261,881	368,743
Total railway operating income	6,466,083	5,261,850	1,204,233
Net railway operating income	5,630,285	4,455,657	1,174,628
Gross income	5,959,699	4,742,275	1,217,424
Total deductions	2,558,607	2,485,597	73,010
Net income	3,401,092	2,256,679	1,144,413
Income applied to sinking funds	291,673	257,323	34,350
Income appropriated for investment in physical property	107,939	1,999,356	—1,891,417
Income appropriated for annuity trusts	52,871	.....	52,871
Income balance	2,948,610	.....	2,948,610

Vandalia.—*Tentative Valuation.*—The Interstate Commerce Commission has served a tentative valuation report as of June 30, 1916, in which it reports the final value for rate-making purposes of the property owned as $39,646,150 and of the property used as $43,798,929. The investment in road and equipment as stated on the company's books was $36,366,572, which the report readjusts to $34,975,695.

Western Maryland.—*Six Months' Guaranty.*—The Interstate Commerce Commission has issued a final certificate stating the amount of this company's guaranty for the six months' period following the termination of federal control as $1,421,361, of which $1,400,000 had been paid in partial payments, leaving a balance due of $24,361.

Dividends Declared

Central of Georgia.—3 per cent, payable June 30 to holders of record June 30.

Chicago & Western Indiana.—1½ per cent, quarterly, payable July 1.

Northern of New Hampshire.—1½ per cent, quarterly, payable July 1 to holders of record June 9.

Trend of Railway Stock and Bond Prices

	July 8	Last Week	Last Year
Average price of 20 representative railway stocks	68.83	67.25	60.68
Average price of 20 representative railway bonds	87.55	87.37	82.31

Railway Officers

Executive

Robert T. Morrow, whose promotion to assistant to the vice-president of the Central region of the Pennsylvania, with headquarters at Pittsburgh, Pa., was announced in the *Railway Age* of June 14, was born on March 2, 1859, at Oswego, N. Y., and was educated at Lehigh University. He entered railway service in 1876 in the shops of the Northern Central (now the Pennsylvania) at Elmira, N. Y., and from 1878 to 1882 he attended college. He was appointed a rodman on the Philadelphia & Erie (now the Pennsylvania) in 1882 and a year later he was appointed assistant supervisor of the eastern division of the same road, holding that position until 1885, when he was appointed supervisor. In 1893 he was appointed assistant engineer, in which position he served a number of other companies now comprising the Pennsylvania. He was appointed assistant superintendent of the Pittsburgh division of the Pennsylvania in 1901 and in December, 1903, he was appointed superintendent of the Western Pennsylvania division at Pittsburgh. In April, 1907, Mr. Morrow was appointed superintendent of the Pittsburgh division, the position he held at the time of his promotion to assistant to the vice-president.

R. T. Morrow

Thomas W. Hulme, whose promotion to the newly created position of vice-president in charge of real estate, taxes and valuation of the Pennsylvania, was announced in the *Railway Age* of June 28, was born on August 11, 1868, at Mount Holly, N. J., and was graduated from the University of Pennsylvania in 1889. He entered railway service in the real estate department and president's office of the Lehigh Valley in 1890, and three years later was promoted to assistant real estate agent. In June, 1904, he entered the service of the Pennsylvania in the real estate department at New York and in November of the same year he was appointed assistant real estate agent of the New York Connecting Railroad. On May 1, 1905, he was appointed assistant real estate agent of the Pennsylvania, Lines East of Pittsburgh, with headquarters at Philadelphia, Pa., and on November 12, 1913, he was promoted to real estate agent. Mr. Hulme was promoted to general real estate agent (corporate) Lines East, in July, 1918, and on March 1, 1920, he was appointed general real estate agent of the Pennsylvania System, with headquarters at Philadelphia, the position he held at the time of his promotion. From May, 1913, to January 1, 1917, Mr. Hulme was also general secretary of the President's Conference Committee on Valuation and on the latter date he was appointed vice-chairman, which position he is also holding at the present time.

T. W. Hulme

M. D. Cloyd, assistant secretary of the Texas & Pacific, with headquarters at Dallas, Tex., has also been appointed assistant to the president.

Financial, Legal and Accounting

L. J. Hensley, auditor of the Kansas City Southern, whose promotion to controller, with headquarters at Kansas City, Mo., was reported in the *Railway Age* of June 14, was born on October 14, 1879, at Buckner, Mo. He entered railway service in January, 1903, as an assistant bill clerk on the Kansas City Southern at Kansas City and later was successively promoted to bookkeeper, traveling material clerk and voucher clerk. Mr. Hensley was promoted to chief clerk to the vice-president and auditor in December, 1908, and held that position until February, 1912, when he was promoted to assistant auditor, with headquarters at Kansas City, Mo. He was promoted to auditor, with the same headquarters on September 1, 1913, and continued in that capacity until his recent promotion to controller, a newly created position. Mr. Hensley's entire railway service has been with the Kansas City Southern.

L. J. Hensley

Bruce Scott, whose promotion to general counsel of the Chicago, Burlington & Quincy and the Colorado & Southern, with headquarters at Chicago, was reported in the *Railway Age* of July 5, was born on March 18, 1874, at Kaneville, Ill. He graduated from the law school of the University of Pennsylvania in 1895 and shortly afterward began private practice in law. Mr. Scott entered railway service several years later when he was appointed attorney for the Chicago, Burlington & Quincy, with headquarters at Aurora, Ill. He was promoted to general attorney, with headquarters at Chicago, in January, 1911, and remained in that position until 1917, when he was promoted to general solicitor, with the same headquarters. Mr. Scott continued to serve in that capacity until his recent promotion to general counsel of the Chicago, Burlington & Quincy and the Colorado & Southern. He succeeded O. M. Spencer, whose death on June 5 was reported in the *Railway Age* of June 14.

Bruce Scott

J. R. Bell, assistant general attorney of the Southern Pacific, with headquarters at New York, has been promoted to general attorney and commerce counsel, with the same headquarters, succeeding **F. H. Wood,** whose resignation to en-

gage in private practice of law was reported in the *Railway Age* of June 7.

Operating

W. C. Bevington, who has been on leave of absence, has resumed his duties as superintendent of the Joplin division of the Missouri Pacific, with headquarters at Nevada, Mo.

J. H. Hughes, assistant superintendent of the Ottawa division of the Canadian Pacific, with headquarters at Ottawa, Ont., has been promoted to superintendent, with the same headquarters, succeeding **H. B. Spencer,** who has retired after 49 years of railway service.

F. R. Borger, assistant superintendent of dining car service of the Chicago, Indianapolis & Louisville, with headquarters at Chicago, has been promoted to superintendent of dining car service, with the same headquarters, succeeding Arnold Shircliffe, who has resigned. **Albert Ferrick** has been appointed assistant superintendent of dining car service, with headquarters at Chicago, succeeding Mr. Borger.

Charles E. Davies, acting general manager of the Canadian National Railways Telegraphs, has resigned to enter the service of another company. Mr. Davies received his first telegraph service experience with the Western Union Telegraph Company at Helena, Montana, in January, 1906. He commenced his career with the Great Northwestern in Ottawa as chief operator. In 1911 he was given charge of the electrical equipment at Ottawa in addition to his other duties as manager. At the beginning of 1924, he was appointed assistant general manager of the company. Mr. Davies held that position only one day when he was promoted to acting general manager.

John A. Appleton, whose promotion to superintendent of the Monongahela division of the Pennsylvania, with headquarters at Uniontown, Pa., was announced in the *Railway Age* of June 14, was born on December 24, 1891, at New York and was graduated from Yale University in 1914. He entered railway service in September, 1915, as a yard clerk on the Pennsylvania and in October, 1917, he entered the engineering corps of the United States Army and was later made captain of the transportation corps in France. In August, 1919, he returned to the Pennsylvania as terminal supervisor of the Greenville Yards at Jersey City, N. J., and in 1920 he was appointed assistant trainmaster of the New York division. He became trainmaster of the Cumberland Valley division on September 15, 1922, with headquarters at Chambersburg, Pa., and on June 1, 1923, he became freight trainmaster of the Philadelphia Terminal division, with headquarters at Philadelphia, Pa. Mr. Appleton was serving in that capacity at the time of his promotion to superintendent of the Monongahela division.

Traffic

A. G. Henderson has been appointed general agent for the Orient of the Great Northern, with headquarters at Shanghai, China.

Engineering, Maintenance of Way and Signaling

C. S. Johnson has been appointed bridge engineer of the Wabash, with headquarters at St. Louis, Mo., a newly created position.

Mechanical

Edward T. Millar, who has been on leave of absence on account of illness, has resumed his duties as general car inspector of the Boston & Maine, with headquarters at Boston, Mass.

Charles H. Wiggin, mechanical superintendent of the Boston & Maine, with headquarters at Boston, Mass., who had completed 42 years of service with the company on July 1, and having requested that he be assigned to less arduous duties, has accordingly been appointed consulting mechanical engineer, with the same headquarters. **William O. Forman,** assistant mechanical superintendent, with headquarters at Boston, has been promoted to mechanical superintendent, with the same headquarters, succeeding Mr. Wiggin.

J. T. St. Clair, acting engineer of car construction of the Atchison, Topeka & Santa Fe, has been promoted to engineer of car construction, with headquarters at Chicago, succeeding **E. Posson,** who has retired.

Edwin B. De Vilbiss, whose promotion to superintendent of motive power of the Central Pennsylvania division, Eastern region of the Pennsylvania, with headquarters at Williamsport, Pa., was announced in the *Railway Age* of June 14, was born on September 13, 1884, at Ft. Wayne, Ind., and was graduated from Purdue University in 1908. He entered railway service on July 1 of the same year as special apprentice of the Pennsylvania in the Ft. Wayne shops and in January, 1911, he was promoted to motive power inspector. On April 1, 1912, he became electrical engineer of the Northwest system and on June 1, 1915, he was appointed assistant engineer of motive power of the Central system. He was appointed assistant engineer of motive power in the office of the general superintendent of motive power on October 15, 1917, and on March 1, 1920, Mr. De Vilbiss was promoted to superintendent of motive power of the Eastern Ohio division, with headquarters at Pittsburgh, Pa. A year later he became master mechanic of the Eastern division, with headquarters at Canton, Ohio, the position he held at the time of his recent promotion to superintendent of motive power.

E. B. De Vilbiss

Purchasing and Stores

E. J. McVeigh, general storekeeper of the Central region of the Canadian National, with headquarters at Toronto, Ont., has been appointed superintendent of reclamation and scrap, with headquarters at Montreal, Que., a newly created position. **E. D. Toye,** assistant general storekeeper of the Central region, with headquarters at Toronto, has been promoted to general storekeeper, with the same headquarters, succeeding Mr. McVeigh. **W. B. Gordon,** district storekeeper, with headquarters at Montreal, has been promoted to assistant general storekeeper, with headquarters at Toronto, succeeding Mr. Toye.

Obituary

L. M. Perkins, executive assistant of the Northern Pacific, with headquarters at St. Paul, Minn., died in that city on July 2. Mr. Perkins was born on November 20, 1879, in Windsor, Vt., and graduated from Dartmouth College in 1901. He entered railway service in April, 1903, as a rodman on the Northern Pacific and was subsequently promoted to instrument man and resident engineer in charge of branch line extensions. He was promoted to assistant engineer on the Lake Superior division in June, 1905, and in November of the following year was appointed assistant engineer in charge of second track construction. Mr. Perkins was promoted to division engineer in April, 1907, and held that position until March, 1910, when he was promoted to engineer maintenance of way of the lines east of Paradise, Mont. He was transferred to the lines west of Paradise in June, 1911. Mr. Perkins was appointed corporate engineer in August, 1918, and continued in that position until the termination of federal control. On January 1, 1921, he was appointed executive assistant, the position which he held until his death.